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REVISION OF THE GENUS COSMOS

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REVISION OF THE GENUS COSMOS
(FAMILY COMPOSITAE)

EARL E. SHERFF

In the course of monographic researches during the past twenty years upon the genus *Bidens*, I have had occasion to examine many specimens of *Cosmos*, also much of the literature pertaining to that genus. Many of the larger libraries and herbaria in this country, also in Europe, were visited. The authorities in charge at these institutions proved invariably courteous and generous in placing at my disposal their numerous botanical resources. More recently a number of them have lent types or otherwise valuable materials for extended studies and comparisons. Largely as a result of this cooperation, the present revision was made possible. It is a pleasure to acknowledge here my indebtedness to these friends of science.

During the progress of the work a large set of photographs of the more important specimens was built up, and a duplicate of this set will be found in the Herbarium of Field Museum of Natural History.

For brevity, numerous exsiccatae studied are omitted, and those retained are cited with the following designations as to the herbaria of the institutions: Botanical Garden of Berlin (Berl.); University of California (Calif.); Carnegie Museum (Carn.); University of Chicago (Chi.); Delessert Herbarium (Del.); Field Museum of Natural History (Field); Gray Herbarium of Harvard University (Gray); Royal Botanical Gardens of Kew (Kew); Missouri Botanical Garden (Mo.); Natural History (Royal) Museum of Vienna (Mus. V.); New York Botanical Garden (N. Y.); Museum of Natural History of Paris (Par.); University of Pennsylvania (Penn.); Botanical Garden of Leningrad (Petrop); Academy of Natural Sciences of Philadelphia (Phila.); United States National Museum (U. S.); University of Vienna (U. V.).

Cosmos Cav. Icon. et Descript. 1: 9. 1791.—Herbae annuae perennesve, interdum elatae, glabrae vel pilosulae vel etiam hispidae; plantarum perennium radicibus saepe tuberiformibus fasciculatisque. Folia opposita, indivisa vel lobata vel semel bis terve pinnatisecta. Capitula normaliter radiata et heterogama; floribus radii 1-seriatis, neutris; disci hermaphroditis, fertilibus. Involucrum subhemisphaericum, bracteis 2-seriatis, basi connatis, membranaceis, striatis, parum inaequalibus (vel exterioribus plerumque herbaceis et interdum angustis minoribus). Receptaculum planum,

paleis planis vel concaviusculis (raro acumine filiformi terminatis) flores hermaphroditos subtendentibus onustum. Capitula majuscula vel mediocria, longe pedunculata, solitaria vel laxe corymboso-paniculata. Corollae radii ligulatae, lamina patente integra vel subdentata saepius rosea vel violacea vel purpurea rarius flava etc.; disci regulares, tubulosae, limbo cylindraceo apice breviter 5-fido. Antherae basi integrae vel vix minutissime 2-dentatae. Styli (florum hermaphroditorum) rami tenues, superne incrassati, hirti, appendicibus brevibus acutisque superati. Achaenia linearia, saepius fusiformia, plus minusve 4-gona vel rarius obcompressa vel etiam alata, superne saepius in rostrum attenuata, basim versus attenuata, basi ipsa plus minusve expansa, apice saepissime aristis 2–8 persistentibus plerumque retrorsum raro antrorsum barbellatis aculeatisve munita.[1]

CLAVIS SPECIERUM

Annuae.

Achaenia aristis antrorsum hispida.

Flores ligulati flavi; achaeniis alatis.....10. *C. Blakei.*

Flores ligulati violacei; achaeniis exalatis.....9. *C. exiguus.*

Achaenia aristis retrorsum hamosa.

Flores ligulati albi vel rosacei nec flavi.

Ligulae perspicuae 1.5–3 cm. longae.....7. *C. bipinnatus.*

Ligulae multo minores et non perspicuae.

Planta elata plerumque 0.6–2 m. alta, achaeniis (rostro adjecto) 1.2–3.5 cm. longis.....6. *C. caudatus.*

Planta minor, gracilis, achaeniis (rostro adjecto) 9–16 mm. longis.....8. *C. parviflorus.*

Flores ligulati sulphurei vel rubro-flavi, interdum basaliter rubro-maculati.

Involucri bracteae exteriores valde perspicueque albo-tomentosae.

Folia (petiolo adjecto) 1–3.5 cm. longa, petiolis 0.5–1.5 cm. longis, capitulis pansis ad anthesin 1.5–2.5 cm. latis. 4. *C. microcephalus.*

Folia 4–10 cm. longa, petiolis usque ad 5 cm. longis, capitulis pansis ad anthesin 3–4 cm. latis.....3. *C. ocellatus.*

Involucri bracteae omnes glabrae vel subglabrae.

Ligulae saturate rubro-flavae vel aurantiacae. 5. *C. sulphureus.*

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[1] Descriptio pro parte ex Benth. et Hook. Gen. Plant. 2: 387. 1873.

Ligulae sulphureae.

Achaenia rostrata, circ. 1.1–1.3 mm. crassa; foliis principalibus 4–6 cm. longis.....1. *C. gracilis.*

Achaenia erostrata, 1.5–2.2 mm. crassa; foliis principalibus 6–17 cm. longis.....2. *C. calvus.*

Perennes.

Ligulae flavae.

Involucri bracteae exteriores 6–8, lineares vel parce linearilanceolatae, 3–5 mm. longae; ligulis obovatis.11. *C. Landii.*

Involucri bracteae exteriores 12–16, linearissimae, 6–7 mm. longae; ligulis anguste ellipticis.....12. *C. Langlassei.*

Ligulae saturate atropurpureae vel atrosanguineae.

Flores disci omnino flavi.....18. *C. montanus.*

Flores disci dentibus purpurei alibi valde flavi.
20. *C. scabiosoides.*

Flores disci omnino plerumque atropurpurei.

Plantae elatae, 0.9–2.5 m. altae; foliis bipinnatifidis supra obscure puberulis, subtus nervisque hirto-pilosiusculis, minutissime glanduloso-rugosis.....21. *C. purpureus.*

Plantae circ. 4–6 dm. altae; foliis pinnatis vel vix bipinnatisectis, non glanduloso-rugosis.

Folia (petiolo adjecto) 3–5 cm. longa, segmentis primariis linearibus.....19. *C. concolor.*

Folia 7–15 cm. longa, segmentis primariis rhomboideo-ovatis.
26. *C. atrosanguineus.*

Ligulae rosaceae vel violaceae vel lilacinae raro subalbidae.

Folia rigida, principalia plerumque pinnatim 3–7-partita, segmentis crassiusculis anguste linearibus, 1–2 (rariter –2.5) mm. latis.....13. *C. crithmifolius.*

Folia membranacea nec rigida.

Folia simplicia, lamina (numquam late) linearia.
14. *C. linearifolius.*

Folia composita, segmentis angustissime linearibus (tantum circ. 0.2–0.5 mm. latis).....15. *C. carvifolius.*

Folia plerumque composita, segmentis latioribus.

Petioli usque ad 8 mm. longi.....17. *C. Palmeri.*

Petioli manifeste longiores.

Plantae austro-americanae.....23. *C. peucedanifolius.*

Plantae centrali- vel boreali-americanae.

Capitula pansa ad anthesin 4–8 cm. lata.

Petioli plerumque 0.5–2 (raro –2.3) cm. longi.

Achaenia 2-aristata.....16. *C. Pringlei.*

Achaenia saepissime 4-aristata...22. *C. Nelsonii.*

Petioli 2–9 cm. longi.....24. *C. diversifolius.*

Capitula pansa ad anthesin circ. 3 cm. lata.
25. *C. Schaffneri.*

Sect. I. **Eucosmos.**[1]—Herbae annuae. Flores ligulati sulphurei, aurantiaci, rosei, albi, etc. Achaenia plerumque plus minusve tetragona, nunc rostrata nunc erostrata, nunc aristata aristis retrorsum hamosis nunc calva, exalata. (Numeri 1–8.)

1. **Cosmos gracilis** Sherff, Bot. Gaz. 88: 304. 1929.

Herba annua, erecta, glabra, gracilis, infra simplex supra ramosa, 4–6 dm. alta, caule subtetragono, internodiis quam foliis multo brevioribus. Folia tenuiter petiolata petiolis parce marginatis usque ad 1.5 cm. longis, petiolo adjecto 4–6 cm. longa, bipinnatisecta, segmentis membranaceis saepius oblongo-linearibus, margine subciliatis, apice acutis, plerumque 1–3 mm. latis. Capitula tenuiter pedunculata pedunculis usque ad 16 cm. longis, non numerosa (unicae plantae circ. 5–12), pansa ad anthesin circ. 1.8 cm. lata et circ. 1 cm. alta. Involucri glabri bracteae exteriores 5–7, anguste cuneato-lanceolatae, obsolete nervatae, saepe patentes, tantum 1.5–2.2 (raro –4) mm. longae; interiores oblongo-lanceolatae demum circ. 7–8 mm. longae. Flores ligulati circ. 5 vel 6, flavidi (non rubido-flavidi), ligula obovati, apice truncato-lobulati, tantum circ. 6–8 mm. longi. Paleae lineari-lanceolatae. Achaenia circ. 6–10, fusiformia, rotundato-tetragona, unaquaque facierum 1-sulcata, infra nigra glabrataque supra rostrato-angustata ac straminea erecto-hispidulaque, apice spinulis patentibus minutissimisque coronata vel demum calva, 1.1–1.7 cm. longa et circ. 1.1–1.3 mm. crassa.

Type specimen: Collected by H. Pittier, *No. 5053*, at altitude of 100–350 meters, vicinity of Olá, Province of Coclé, Panama, December 7–9, 1911 (U. S.).

Distribution: Known only from type locality in Panama.

Specimens examined: *H. Pittier 5053* (type, U. S.; cotype, Gray).

Differs from *Cosmos sulphureus* Cav. in having smaller size, more delicate habit, the stem glabrous with the internodes shorter

[1] Sectio nov. Includes *C. bipinnatus* Cav., the type species of the genus.

than the leaves (these smaller and less compound), the flowering and fruiting heads much smaller, the exterior involucral bracts proportionately smaller, the rays golden yellow, not orange, etc.

2. **Cosmos calvus** (Schz. Bip. ex Miq.), comb. nov.; *Adenolepis* (*Bidens*) *calva* Schz. Bip. Flora 30: 375. 1847 (nomen subnudum); *A. calva* Schz. Bip. in Zollinger, Syst. Verzeichn. Ind. Archipel. Pflanz. 1: 123. 1854 (nom. subnudum); etiam in Miquel, Fl. Ind. 2: 79. 1856 (cum descript.); *Cosmos sulphureus* var. *leiorhynchus* Griseb. Fl. Brit. W. Ind. Isls. 374. 1861; cf. Sherff, Bot. Gaz. 80: 376. 1925; vide C. B. Clarke, Comp. Ind. 141. 1876; *Bidens artemisiaefolia* var. *calva* (Schz. Bip. ex Miq.) O. Ktze. Rev. Gen. Pl. 1: 321. 1891.

Herba erecta, annua, gracilis, glabra, ramosa, ±6 dm. (verisimiliter usque ad 1 m.) alta. Folia bipinnatisecta vel etiam tripinnata, principalia petiolo adjecto 6–17 cm. longa, petiolis 1.5–3 cm. longis, segmentis linearibus, apice acutis, margine integris sed minutissime spinuloso-ciliatis, non crassis, 1–4 mm. latis. Capitula ramos terminantia, tenuiter pedunculata pedunculis 8–18 cm. longis, pansa ad anthesin circ. 3–3.5 cm. lata et 8–12 mm. alta. Involucri bracteae glabrae, exteriores circ. 8, lineari-subulatae, ad basim 1–1.5 mm. latae, e basi usque ad apicem acutum induratumque sensim angustatae, 5–8 mm. longae; interiores lanceolato-oblongae, paulo longiores. Flores ligulati (6–) 8, sulphurei ac numquam rubido-flavidi, ligula obovato-oblanceolati, apice subdenticulati, 10–14 mm. longi. Achaenia atro-plumbea, lineari-fusiformia, obcompressa vel rotundo-tetragona, omnino manifeste 4-sulcata, glabra, supra ad apicem truncatum angustata (non vere rostrata), exaristata, 10–14 vel tantum 8 mm. longa et 1.5–2.2 mm. lata.

Type specimen: Collected by Henri Zollinger, *No. 2945*,[1] at altitude of 1,500–1,900 feet, in garden near Maësan, Province of Bondowosso, Java, June (Par.).

Distribution: Venezuela and Island of Trinidad; also British East India, Siam, Java, and Philippine Islands.

Specimens examined: *Ahern's Collector* (*Forestry Bureau No. 3383*), Province of Rizal, Luzon, Philippine Isls., November, 1905 (Mo.); *L. H. Bailey & E. Z. Bailey 509*, alt. 3,000–3,500 feet, Los Chorros, Venezuela, December 27, 1920 (Field); *M. S. Clemens 801*, Camp Keithley, Lake Lanao, Mindanao, Philippine Isls., November, 1906 (Field); *A. D. E. Elmer 7039*, Palo, Province of Leyte, Leyte, Philippine Isls., January, 1906 (N. Y.; Petrop.); *A. Fendler 1966*, vicinity of the Colony of Tovar, Venezuela, 1856–57 (Gray; Mo.; Par.; Phila.); *edit. R. F. Hohenacker 344*, near City of Mangalor, British East India, 1847 (Del., 2 sheets; Par.; U. V.; nomen vulgare Bugudi); *J. Linden 1510*, alt. 3,000 feet, savannas of Valencia, Province of Carabobo, Venezuela, December, 1843 (Del.); *idem* (similiter) *1510*,

[1] In his catalogue (p. 123), Zollinger gave the number *2594*, but the herbarium sheets examined give it as *2945*.

alt. 4,500 feet, Buena Vista, Province of Carabobo, December, 1843 (Par.); *R. C. McGregor*, Solsona, Ilocos Norte, Luzon, Philippine Isls., December, 1923 (Calif.); *E. D. Merrill 3367*, Pasacao, Province of Camarines, Luzon, November, 1903 (N. Y.); *Moritz 68*, Caracas, Venezuela (Par.); *H. Pittier 12042*, scattered in savannas, between Guanare and Portuguesa, Venezuela, December 28, 1925 (Mo.; N. Y.; U. S.); *M. Ramos & G. Edano*, Maluko and vicinity, Bukidnon Subprovince, Mindanao, Philippine Isls., July, 1920 (Calif.; Gray); *idem*, Anuling, Province of Zambales, Luzon, Philippine Isls., November–December, 1924 (Calif.); *J. R. Rock 1622*, alt. 750–900 meters, between Pang Kia and Meh Kha Chan, basin of the Meh Lao, Chiengmai Province, Siam, January 2, 1922 (U. S.); *H. Zollinger 2945* (type and cotype, Par.).

Schultz Bipontinus, in his open letter to Hohenacker (Flora, loc. cit.), mentioned first the Hohenacker plant and second the Zollinger plant. He gave no description, however. In 1856, Miquel (loc. cit.) published a description. Miquel, however, followed his description with a reference first of all to Zollinger Cat., p. 123, and secondly to "Flora bot. Zeit. 1847, p. 375," thus establishing the Zollinger plant as the effectively published type. Until recently (cf. Bot. Gaz. 80: 376. 1925), I myself was constrained to accept Grisebach's varietal status for this plant under *C. sulphureus*. During the past year, however, I have had opportunity to examine much additional herbarium material of both forms, also to cultivate many specimens of *C. sulphureus* itself. The differences between the two are found to be greater than between the two members of several other pairs of species in *Cosmos;* e.g., *C. crithmifolius* and *C. Landii*, *C. diversifolius* and *C. atrosanguineus*, *C. diversifolius* and *C. peucedanifolius*, and *C. sulphureus* and *C. caudatus*.[1]

3. **Cosmos ocellatus** Greenm. Proc. Amer. Acad. 41: 265. 1905.
Folia saepius 2–3-pinnata, achaeniis biaristatis. *C. ocellatus* sensu stricto.
Folia plerumque tripartita, achaeniis etiam juvenibus apice exaristatis ..... var. *Greenmanii*.

Herba annua, erecta vel adscendens, simplex vel ramosa, hinc inde pilis articulatis instructa, 3–5 dm. alta. Folia tenuissime petiolata petiolis usque ad 5 cm. longis, petiolo adjecto 4–10 cm. longa et 1.5–5 cm. lata, saepius 2–3-pinnata, segmentis ultimis saepius oblonge lanceolato-linearibus, membranaceis, infra pallidioribus, apice acutis, marginibus ciliatis, faciebus pilis multiloculatis adpressis hispidis. Capitula pauca (plerumque 1–7), longe pedunculata pedunculis tenuibus 1–2.5 dm. longis, pansa ad anthesin 3–4 cm.

[1] I am indebted to Dr. H. LeComte of the Muséum d'Histoire Naturelle, Paris, for the loan of several specimens by Zollinger, Hohenacker, etc., for reexamination.

lata et 1–1.4 cm. alta. Involucri bracteae exteriores 7–9, pilis longis candidis articulatis valde perspicueque albo-tomentosae, adpressae, lineares, apice induratae, 5–8 (–11) mm. longae, interiores late oblongo-lanceolatae, brunneae, apice minute pubescentes alibi nunc glabratae nunc (praecipue ad medium) moderate pilosae, 7–10 (–12) mm. longae. Flores ligulati 5 vel 6 (circ. 8 ex Greenmanio), ligula obovato-oblongi, apice late emarginati, maximam partem aurei sed plerumque macula plus minusve atrosanguinea infra medium ornati, 1.2–1.7 cm. longi. Achaenia lineari-attenuata, tetragona, unaquaque facierum 1- vel 2-sulcata, infra apicem longirostrata rostro sursum hispido et supra stramineo, corpore atro ac inferne glabro (rostro adjecto) 1.6–2.2 cm. longa et circ. 0.4–0.6 mm. crassa, paleas aurantiacas apicem versus macula magna nigra maculatas demum multo superantia, apice biaristata aristis tenuibus, 1–1.6 mm. longis, retrorsum hamosis hamis elongatis albis rectis gracillimis.

Type specimen: Collected by C. G. Pringle, *No. 8386 pro parte*, at altitude of 7,500 feet, in thin soil on the knobs of the Sierra de Tepoxtlán, State of Guerrero, Mexico, October 14, 1900 (Gray).

Distribution: Known only from type locality in State of Guerrero, Mexico.

Specimens examined: *C. G. Pringle 8386 pro parte* (type, Gray; cotypes, Field; Mo., etc.).

Cosmos microcephalus (q.v.) may prove to be a depauperate form of this species.

Cosmos ocellatus var. **Greenmanii** Sherff, Bot. Gaz. 88: 305. 1929.

A specie foliis plerumque tripartitis foliolis ovato-lanceolatis serratisque, achaeniis etiam juvenibus apice exaristatis differt.

Type specimen: Collected by C. G. Pringle, *No. 8386 pro parte*, with the type of the species (Field).

Distribution: Known only from type locality in State of Guerrero, Mexico.

Specimens examined: *C. G. Pringle 8386 pro parte* (type, Field; cotypes, Mo., etc.).

4. **Cosmos microcephalus** Sherff, Bot. Gaz. 76: 89. 1923.

Herba annua, erecta, gracillima, plus minusve hispido-pubescens, caule simplici 2–3 dm. alto. Folia petiolata petiolis 5–15 mm. longis, petiolo adjecto 1–3.5 cm. longa, bipinnata, segmentis linearibus vel lineari-lanceolatis, plerumque acutis. Capitula solitaria, longe tenuiterque pedunculata pedunculis 8–17 cm. longis, (pro genere) parva, pansa ad anthesin 1.5–2.5 cm. lata et 8–12 mm. alta. Involucri bracteae exteriores 6–8, lineares, obtuse calloso-apiculatae, glanduloso-hispidae, 4–6 mm. longae, interiores late lanceolatae, manifeste longiores. Flores ligulati circ. 5, flavi, late obovati, apice truncati vel emarginati, 8–12 mm. longi. Achaenia tenuissime linearia, atra

vel apicem versus brunneo-straminea, superne in cervicem subcapilliformem sensim angustata, erecto-hispida, corpore (cervice adjecta) 1.6–2.2 cm. longa et inferne circ. 0.6 mm. lata, apice nunc biaristata aristis tenuibus retrorsum hamosis usque ad 2.3 mm. longis, nunc etiam calva.

Type specimen: Collected by C. J. W. Schiede, *No. 1561*, in cold regions, Mexico (Berl., 2 sheets).[1]

Distribution: Known only from type locality in Mexico.[1]

Specimens examined: *Schiede 1561* (2 type sheets, bearing about 50 specimens, Berl.).

Closest to *C. ocellatus* Greenm., with which it should be compared.

5. **Cosmos sulphureus** Cav. Icon. et Descript. 1: 56. *pl. 79.* 1791; cf. Safford, Journ. Wash. Acad. Sc. 8: 613. 1918; *Coreopsis artemisiaefolia* Jacq. Icon. Pl. Rar. 3: *pl. 595.* 1786–93; *Cosmea sulphurea* Willd. Sp. Pl. 3: 2250. 1804; *Bidens sulphurea* Schz. Bip. in Seemann, Bot. Voy. Herald 308. 1852–57; *Cosmos aurantiacus* Klatt, Leopoldina 25: 105. 1889.

Achaenia non nisi demum exaristata.....*C. sulphureus* sensu stricto.

Achaenia etiam juvenia exaristata.....var. *exaristatus.*

Herba annua, erecta, 6–21 dm. alta, caule plus minusve tetragono ac ramis pilis multiloculatis patentibus hinc inde hispidis. Folia petiolata petiolis scabrido-hispidis saepius 1–7 cm. longis, petiolo adjecto usque ad 1.5 (vel in cultu etiam ad 3.5) dm. longa, bi- vel tripinnatisecta, segmentis membranaceis linearibus vel lanceolatis, aegre obscureque spinuloso-ciliatis, acerrime apiculatis, glabris vel sparsim hispidis. Capitula pedunculos tenues 1–2 dm. longos terminantia, pansa ad anthesin 3.5–5.5 cm. lata et 1.2–1.8 cm. alta. Involucri bracteae exteriores plerumque 8, lineari-subulatae ac e basi usque ad apicem acrem sensim angustatae, tergo glabrae et 3–5-nervatae, margine saepius ciliatae, 5–7 (–10) mm. longae; interiores oblongo-lanceolatae 9–11 (–13) mm. longae. Flores ligulati circ. 8, saturate aurantiaci vel flavido-rubri, ligula obovati, apice saepe 1–5-denticulati, 1.8–2.8 cm. longi et 1–1.7 cm. lati. Paleae oblongo-lineares. Achaenia corpore ipso lineari-fusiformia, obcompressa vel saepissime rotundo-tetragona, omnino 4-sulcata, atra, minutissime subadpresso-hispida vel raro glabrata, 0.8–1.2 mm. lata, supra in rostrum elongatum hispidum capilliforme biaristatum vel raro triaristatum ac setuloso-coronatum angustata, omnino (aristis exclusis) 1.6–2.8 cm. longa, aristis tenuissimis late patentibus hinc inde aegre retrorsum hamosis 4.5–7 mm. longis.

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[1]No other data were left by Schiede, but the plants were collected between 1828 and 1836 (the dates respectively of his arrival in Mexico and of his death), and the locality lay without doubt within the triangular area reaching from Papantla and Orizaba at the east to Angangueo at the west (cf. Hemsley, Biol. Centr. Amer. Bot. 4: 123. 1886).

Type specimen: Raised from Mexican seed in the Royal Garden at Madrid, Spain, and flowering in the month of November (represented by Cavanilles' type plate).

Distribution: Mexico, almost throughout; Guatemala, Salvador, Panama, Colombia, British Guiana, and Brazil (State of Minas Geraes); often cultivated and more or less established in Florida, Bermuda, Cuba, Porto Rico, Montserrat, St. Vincent, Marianne Isls., Philippine Isls., etc.

Specimens examined: *Fr. Abbon 228*, alt. 700 meters, State of Nuevo León, Mexico, August, 1911 (U. S.); *Virlet d'Aoust 366*, State of San Luis Potosí, Mexico, 1851 (Par.); *Brother Arsène 6050*, alt. 1,600 meters, La Escalera, vicinity of Morelia, State of Michoacán, Mexico, November 6, 1911 (Gray; Mo.; N. Y.; U. S.); *G. Bernoulli 225*, in fields, Tocotenango near city of Guatemala, Guatemala, December, 1862 (Del.; N. Y.; type collection of *Cosmos aurantiacus* Klatt); *M. Botteri*, Mexico, 1856 (Del.); *idem 919*, Mt. Orizaba, Mexico (Gray); *T. S. Brandegee*, Cerro Colorado, Cofradía, vicinity of Culiacán, State of Sinaloa, Mexico, October 26, 1904 (Calif.; U. S.); *N. L. & E. G. Britton 7972*, garden, Porto Rico, February 7, 1924 (U. S.); *S. Brown, N. L. Britton, & P. Bisset 2179*, cult., Bermuda, May 22–June 6, 1914 (N. Y.); *S. Calderón 93*, San Salvador, Salvador, January, 1922 (Field; Gray; Mo.; N. Y.; U. S.); *Mr. Caley*, St. Vincent, 1817 (Del., 2 sheets); *C. Conzatti 2289*, alt. 1,800 meters, Cerro San Felipe, Distrito del Centro, State of Oaxaca, Mexico, September 20, 1908 (Field; Gray); *idem et V. González 54*, alt. 1,750 meters, State of Oaxaca, July–August, 1900 (Gray; U. S.); *J. S. De La Cruz 1066*, growing 5 feet high, Moruka River, Comaca, Pomeroon District, British Guiana, August 26, 1921 (N. Y.; U. S.); *comm. Alfredo Dugès 424A*, cult., also spontaneous, vicinity of Guanajuato, State of Guanajuato, Mexico, 1895 (Gray; nom. vulg. mirasol amarillo); *H. Galeotti 2055*, savannas, Cordillera, State of Oaxaca, Mexico, January–April, 1840 (Del.); *A. Gehrt 3283*, State of Minas Geraes, Brazil (Gray); *Ghiesbreght 289*, State of Colima, Mexico, October (Gray); *E. A. Goldman 260*, Valley of Río del Fuerte, State of Sinaloa, Mexico, October 15, 1898 (Gray; U. S.); *Brother Heriberto 363*, vicinity of Cartagena, Colombia, 1920 (U. S.); *E. W. D. Holway 3457*, Chapala, State of Jalisco, Mexico, September 19, 1899 (Gray); *W. F. Karwinsky*, Mexico (Del.); *E. P. Killip 3116*, Balboa Heights, Canal Zone, Panama, October 2, 1917 (N. Y.); *F. H. Lamb 346*, Mazatlán, State of Sinaloa, Mexico, December 29, 1894 (Gray); *Mr. & Mrs. J. G. Lemmon 91*, vicinity of Cuernavaca, State of Morelos, Mexico, 1905 (Calif.; Gray); *Liebmann 618*, Mexico, November, 1841 (Del.; Par.; U. S.); *idem 619*, Mexico (Par., 2 sheets; U. S.); *A. Luna 83*, hills of Banao, Province of Santa Clara, Cuba, January, 1920 (N. Y.); *Ynes Mexia 779*, alt. 1,100 meters, common in thickets and open places, Rincón de Mateo, near Yxtlán, State of Nayarit, Mexico, September 25, 1926 (Mo.; U. S.; nom. vulg. mirasol); *F. Müller 1017*, Mt. Orizaba, Mexico, November, 1853 (N. Y.; Par.); *E. W. Nelson 1498*, alt. 5,200–6,800 feet, Valley of

Oaxaca, State of Oaxaca, Mexico, October 2, 1894 (U. S., 2 sheets); *C. R. Orcutt 4691*, Xochimulco, Federal District, Mexico, October 4, 1910 (Field); *J. G. Ortega 80*, alt. 100 meters, La Gloria, State of Nayarit, Mexico, 1923 (U. S.; nom. vulg. mirasol); *idem 585*, alt. 480 meters, San Ignacio, State of Sinaloa, Mexico (Field); *idem 4450*, alt. 300–600 meters, La Bajada, Tamazula, State of Durango, Mexico, November, 1921 (Gray; U. S.); *idem 4815*, State of Sinaloa, Mexico, 1922 (U. S.); *idem 5265*, Sianori, State of Durango, 1924 (U. S.); *idem 6431*, Coacoylitos, State of Sinaloa, 1926 (U. S.); *E. Palmer*, Tepic, Territory of Tepic, Mexico, January 5–February 6, 1892 (U. S.); *idem 191*, Acapulco and vicinity, State of Guerrero, Mexico, October, 1894–March, 1895 (Calif.; Field, 2 sheets; Gray; Mo.; N. Y.; U. S.); *idem 442*, Río Blanco, State of Jalisco, Mexico, September, 1886 (Gray; Mo.; Phila.; U. S.); *idem 546*, Mapimi and vicinity, State of Durango, Mexico, October 21–23, 1898 (U. S.); *idem 1222*, State of Colima, Mexico, January 9–February 6, 1891 (Calif.; Gray; N. Y., 2 sheets; cf. specim. a Roseo lectum); *idem 1805*, Culiacán, State of Sinaloa, Mexico, October 25–November 18, 1891 (Field; Gray; N. Y.; U. S.); *C. G. Pringle 4516*, hillsides near Guadalajara, State of Jalisco, Mexico, September 5, 1893 (Calif.; Del., 2 sheets; Field, 2 sheets; Gray; N. Y.; Phila.; U. S.); *idem 9889 pro parte*, alt. 5,000 feet, Cuernavaca, State of Morelos, Mexico, November 12, 1902 (Field; U. S., etc.); *B. P. Reko 4568*, Guadalajara, State of Jalisco, Mexico, November, 1921 (U. S.); *J. N. Rose*, cult. e sem. a Palmero sub num. *1222* lect., 1892 (U. S.); *idem 2825*, on road between Colotlán and Bolaños, State of Jalisco, Mexico, September 7–9, 1897 (U. S.); *J. N. Rose, J. H. Painter, & J. S. Rose 10207*, near Cuernavaca, State of Morelos, Mexico, September 12–13, 1905 (U. S.); *J. N. Rose, P. C. Standley, & P. G. Russell 13043*, Sierra de Alamos, vicinity of Alamos, State of Sonora, Mexico, March 18, 1910 (U. S.); *A. E. Salazar 585*, growing 1.25–1.50 meters high, in open, sandy places, Rancho del Coacoyol, San Ignacio, State of Sinaloa, Mexico, September 13, 1918 (U. S.); *Mr. Salle*, Mt. Orizaba, Mexico (Del.); *J. G. Schaffner 204*, in sandy places, Mexico, September, 1876 (Gray); *J. G. Schaffner 397*, Orizaba, State of Vera Cruz, Mexico, August, 1855 (Par.); *B. Seemann*, near City of Panama, Panama (Par.); *J. A. Shafer 385*, roadside, Montserrat, West Indies, February 4, 1907 (N. Y.); *idem 1848*, spontaneous, vicinity of La Gloria, Camaguey, Cuba, February, 1909 (N. Y.; U. S.); *P. Sintenis 5773*, Porto Rico, December 31, 1886 (Gray; U. S.); *J. K. Small 7944*, pine lands west of Silver Palm, Florida, November 22, 1916 (N. Y.); *idem et J. B. DeWinkeler 9767*, pine lands near Crooked Lake, Polk County, Florida, December 12, 1920 (N. Y.); *iidem et C. A. Mosier 10972*, swamps, Apalachicola, Florida, November 26, 1923 (N. Y.); *P. C. Standley 19235*, alt. 650–850 meters, weed in garden, vicinity of San Salvador, Salvador, December 20, 1921–January 4, 1922 (Gray; N. Y.; U. S.; nomina vulg. flor de muerto, botón de oro); *idem 30005*, in garden, Río Pedro Miguel, near East Paraíso, Canal Zone, Panama, January 7, 1924 (U. S.; nom. vulg. niño muerto); *J. B. Thompson* (direction of) *348*, cult., Guam, Mari-

anne Isls. (U. S.); *R. A. Toro 487*, vicinity of Medellín, Colombia, August 28, 1927 (N. Y.); *L. B. Warren*, Georgetown, British Guiana, 1924 (U. S.).

The plants just listed for this species have the more or less hispid stem, branches, petioles and foliar midribs as shown in Cavanilles' type plate. This fact, together with the fact that they mostly came from Mexico, as did Cavanilles' material originally, shows that Cavanilles was describing the species having reddish-orange ligules (*C. aurantiacus* Klatt) and not the truly sulphureous-rayed *C. calvus*. His description of the ligules, "saturate sulphurea," clearly was inexact, as indeed a number of other color descriptions given by him (e.g., "coccinea" for the orange-yellow rays of *Bidens sambucifolia*, op. cit. 3: 15).

The species has been used widely in recent years for ornament and also has been known for centuries to the Aztecs of Mexico as a dye plant (cf. J. N. Rose, Gard. and Forest 8: 484. *fig. 66*. 1895; W. E. Safford, Journ. Wash. Acad. Sc. 8: 613. 1918).

Cosmos sulphureus var. **exaristatus**, nom. nov.; *C. sulphureus* f. *exaristatus* Brandeg. in herb.

A specie achaeniis etiam ovariis exaristatis differt.

Type specimen: Collected by *C. A. Purpus, No. 6793*, Sierra de Tonalá, State of Chiapas, Mexico, September, 1913 (Calif.).

Distribution: Known only from the states of Morelos, Oaxaca, and Chiapas, southern Mexico.

Specimens examined: *E. Bourgeau 1206*, ravine near Cuernavaca, State of Morelos, November 14, 1865 (Del., 2 sheets); *C. G. Pringle 9889 pro parte*, alt. 5,000 feet, Cuernavaca, November 12, 1902 (N. Y.); *C. A. Purpus 6793* (type, Calif.; cotypes, Field; Gray; N. Y.; U. S.); *C. L. Smith 291*, alt. 7,000–8,000 feet, Sierra de San Felipe, State of Oaxaca, October, 1894 (Mo.).

The exaristate-achened plants are here treated varietally to conform with the varietal status for the exaristate-achened plants of *C. bipinnatus* (var. *exaristatus* DC.).

6. **Cosmos caudatus** HBK. Nov. Gen. et Sp. 4: 188 (240). 1820; *Bidens Berteriana* Spreng. Syst. Veg. 3: 454. 1826; *Cosmea caudata* Spreng. loc. cit. 615; *C. cordatus* H. & K. ex Benth. Bot. Sulph. 186. 1844 (sphalm); *Bidens caudata* Schz. Bip. in Seem. Bot. Voy. Herald 308. 1852–57.

Herba annua, erecta, caule glabrato vel pilis multiloculatis hinc inde consperso, sulcato, obscure tetragono, 0.6–2 (–2.5) m. alto. Folia tenuiter petiolata, petiolis principalium pro unica planta nunc brevibus (1–2 cm.) nunc multo longioribus (etiam 5–7 cm.), petiolo adjecto 1–2 dm. longa, saepius tripinnatisecta, circumambitu del-

toidea, segmentis ultimis oblongo-lanceolatis, membranaceis, glabratis sed margine spinuloso-ciliatis, apice acribus et saepe mucronatis, saepius 3–10 mm. latis. Capitula (pro plantae magnitudine parva) non numerosa, tenuiter pedunculata pedunculis saepius glabratis 1–3 dm. longis, pansa ad anthesin plerumque tantum 2.5–3 cm. lata et circ. 8–12 mm. alta. Involucri bracteae exteriores circ. 8, linearisubulatae, tergo glabrae sed margine ciliatae, saepe patentes, circ. 6–10 mm. longae, interioribus oblongo-linearibus vel etiam late oblongo-lanceolatis subaequales. Flores ligulati circ. 8, ligula oblongo-oblanceolati, purpurei rosaceive, apice saepe obtuse trilobati lobo mediano longiore, nunc plus minusve parvi abortivique nunc 1–1.5 cm. longi. Achaenia saepius 20–30, infra fusiformia, curvata, plus minusve tetragona, unaquaque facierum profunde 1-sulcata, nigra vel hinc inde brunnea, glabrata vel minutissime spinuloso-scabrida, 1.2–1.5 mm. crassa; supra longe rostrato-attenuata, recta vel subcurvata, teretiuscula, brunnea vel straminea, sulcata, dense erecteque setosa; corpore (rostro adjecto) 1.2–3 (vel etiam –3.5) cm. longa; apice biaristata vel saepius imperfecte triaristata aristis (principalibus tenuibus) retrorsum hamosis, late divergentibus vel etiam reflexis, 3–5 mm. longis.

Type specimen: Collected by Humboldt and Bonpland, near Havana, Cuba, March [1801] (Par.).

Distribution: Throughout the West Indies; in Florida, but rare; in Mexico from states of Tamaulipas and Sinaloa southward; widely distributed in Central America; extending southward in South America to Ecuador, Bolivia, Paraguay, and southernmost Brazil. In the eastern hemisphere occurring in French Indo-China, British East India, Philippine Islands, Molucca Islands, Island of Sumatra, Island of Mauritius, etc.

Specimens examined: *W. L. Abbott 244*, common along roadside, vicinity of Samaná, Samaná Peninsula, Santo Domingo, December, 1920 (U. S.); *idem 630*, Pimentel, Province of Pacificador, Santo Domingo, January 20–25, 1921 (U. S.); *idem 1503*, alt. up to 200 meters, roadside, vicinity of Samaná, Santo Domingo, January 8, 1922 (U. S.); *E. André K1255*, equatorial America (N. Y.); *anon.*, Surinam (Phila.); *H. H. Bartlett & C. D. LaRue 192*, Asahan, east coast of Sumatra, 1918 (Calif.); *J. Bermejos 358*, Palawan, Philippine Isls., January, 1906 (N. Y.; U. S.); *Bertero*, Porto Rico (ex herb. Spreng., Par.; type of *Bidens Berteriana* Spreng.); *Blauner 36*, West Indies, 1853 (Del.); *Blodgett*, Key West, Florida (N. Y., 2 sheets); *E. G. Britton 2886*, between Grange Hill and Glasgow, Jamaica, March 1–13, 1908 (N. Y.); *eadem et D. W. Marble 1233*, shaded bank, St. Peter, St. Thomas, West Indies, February 11–22, 1913 (N. Y.; U. S.); *N. L. Britton & E. G. Britton 388*, vicinity of Matanzas, Cuba, March 16, 1903 (N. Y.); *iidem et M. S. Brown 6642*, roadside, vicinity of Dorado, Porto Rico, March 20–22, 1922 (N. Y.); *N. L. Britton & J. F. Cowell 25*, cult. e sem. lectis September 5, 1901, St. Croix, American Virgin Isls. (N. Y.); *iidem 25*, the original (spontaneous) material itself (N. Y.); *iidem 390*, roadside, vicinity of Utuado, Porto

Rico, March 15–20, 1906 (N. Y.); *N. L. Britton, F. S. Earle, & C. S. Gager 6885*, growing 2 meters high, roadside, San Diego de los Baños, Province of Pinar del Río, Cuba, August 31–September 3, 1910 (N. Y.; U. S.); *N. L. Britton & J. A. Shafer 776*, alt. 325 meters, on bank, Tortola, Virgin Isls., February 13–17, 1913 (N. Y.; U. S.); *W. E. Broadway*, open places, St. George, Grenada, West Indies, December, 1904 (N. Y.; U. S.); *idem 524*, on bank of St. Madeleine Road, vicinity of Cayenne, French Guiana, June 20, 1921 (Gray; N. Y.); *idem 7419*, Cedros, Trinidad, November 20, 1915 (N. Y.); *Burchell 9121*, tropical Brazil (Gray); *S. Calderón 90*, San Salvador, Salvador, January, 1922 (Gray; N. Y.; U. S.); *idem 1242*, Santo Domingo, Salvador, 1922 (Gray; U. S.); *idem 2403*, in garden, San Salvador, Salvador, 1928 (Field); *idem 2404*, cult., eodem loco et tempore (Field); *Mr. Caley*, St. Vincent, West Indies, 1817 (Del., 2 sheets); *N. Catalan*, Province of Laguna, Luzon, Philippine Isls., February–March, 1917 (Calif.); *J. R. Churchill*, Constant Spring, Jamaica, March 23, 1897 (Gray); *J. & M. S. Clemens 4413*, mission grounds, Tourane, Annam, French Indo-China, May–July, 1927 (Mo.); *R. Combs 623*, common in waste places, Cieneguita, District of Cienfuegos, Province of Santa Clara, Cuba, September 30, 1895 (Gray; N. Y.); *J. F. Cowell 91*, between Mt. Hope and Santa Rita Trail, Panama, February 25, 1905 (N. Y.); *J. S. De La Cruz 1009*, growing 8 feet high, Santa Rosa, Moruka River, Pomeroon District, British Guiana, August 16, 1921 (Gray; N. Y.; Phila.; U. S.); *idem 1217*, Kamwatta, Pomeroon District, September 21, 1921 (N. Y.); *idem 1862*, growing 3 feet high, vicinity of Bartica, on the Essequibo River, Lat. 6° 25′ N., British Guiana (N. Y.; U. S.); *idem 2516*, Waramuri Mission, Moruka River, Pomeroon District, British Guiana, October 23–27, 1922 (Calif.; Gray; N. Y.; Phila.; U. S.); *idem 2932*, Pomeroon River, Pomeroon District, January 14–20, 1923 (Gray; N. Y.; U. S.); *idem 3668*, Waini River, Northwest District, British Guiana, April 3–18, 1923 (Calif.; Gray; N. Y.; Phila.; U. S.); *idem 3776*, eodem loco et tempore (Calif.; Gray; N. Y.; Phila.; U. S.); *idem 3959*, Wanama River, Northwest District, Lat. 7° 45′ N., Long. 60° 15′ W., May 10–23, 1923 (Gray; N. Y.; U. S.); *idem 4330*, Assakatta, Northwest District, Lat. 7° 45′ N., Long. 59° 5′ W., September 18–28, 1923 (Calif.; Gray; Mo.; N. Y.; Phila.; U. S.); *von Schack*, Trinidad, West Indies (N. Y.); *De Vore & Hoover 234*, Santa Cruz, District of Davao, Mindanao, Philippine Isls., April, 1903 (U. S.); *A. O'Donovan*, vicinity of Santiago de las Vegas, Province of Havana, Cuba, November 17, 1904 (N. Y.); *P. Dusén 9869*, in ruderal and bush-covered places, Porto Don Pedro II, State of Paraná, Brazil, May 31, 1910 (N. Y.; U. S.); *Père Duss 1443*, growing 1.3 meters tall, naturalized in environs of St. Pierre, Martinique, West Indies, 1879 (N. Y.); *idem* (similiter) *1443*, West Indies, 1884 (U. S.); *idem 2499*, growing 3–5 feet tall, road from Basse-Terre to Gourbevre at Gourbevre, Guadeloupe, West Indies, 1892 (U. S.); *idem* (similiter) *2499*, introduced and naturalized in nearly all parts of Guadeloupe, 1893 (N. Y.); distrib. *Eggers*, St. Kitts, West Indies, December, 1882 (U. S.); *Eggers*, St. Thomas, West

Indies, June 24 and December 12, 1876 (Gray); *idem 2973*, Aybonito, at La Lima, Porto Rico, December 5, 1885 (U. S.); *idem 5942*, at Great Courland River, Tobago, West Indies, November, 1889 (N. Y.); *A. D. E. Elmer 7037*, Palo, Province of Leyte, Leyte, Philippine Isls., January, 1906 (N. Y.); *idem 14386*, Irosin (Mt. Bulusan), Province of Sorsogon, Luzon, Philippine Isls., October, 1915 (U. S.); *H. Fernando 100*, Province of Santa Clara, Cuba, November 13, 1919 (N. Y.); *W. C. Fishlock 309*, pastures, Purcells, Tortola, Virgin Isls., January 1, 1919 (Gray; Phila.); *A. Fredholm 3137*, hillside near Port Antonio, Jamaica, July 7, 1897 (N. Y.; U. S.); *Funck & Schlim 25*, Guadeloupe, West Indies, December, 1845 (Del.); *G. F. Gaumer 2505*, Mérida, State of Yucatan, Mexico (Field); *idem 2075*, Chichankanab, State of Yucatan (Field; U. S.); *Glaziou 12844*, Caminho do Macaco, State of Rio de Janeiro, Brazil, April 14, 1881 (N. Y.; U. S.); *idem 14007*, State of Rio de Janeiro (Del., 3 sheets); *H. A. Gleason 600*, along railway tracks, dense upland forest, Rockstone, British Guiana, July 15–August 1, 1921 (N. Y.; U. S.); *G. P. Goll 249*, Candelaria, Porto Rico, November 11, 1899 (U. S.); *idem 741*, Jaguey (Coamo), Porto Rico, November 23, 1899 (U. S.); *idem 927*, dry soil by roadside, Mayagüez, Porto Rico, November 30, 1899 (U. S.); *L. Hahn 383*, between St. Pierre and the Fond St. Denis, Martinique, West Indies, December, 1867 (Del.); *E. Hassler 8826*, growing 1–2 meters tall in ruderal places in the hill region, Cordillera de Villa-Rica, Paraguay, January, 1905 (Hassl.); *S. Hayes 266*, Manzanillo Is., Panama, October 20, 1859 (N. Y.); *A. A. Heller 6134*, on Adjuntas Road, 7 miles from Ponce, Porto Rico, November 27, 1902 (Gray; N. Y.; Phila.; U. S.); *idem et uxor 133*, grassy field, near Río Pedras, Porto Rico, January 13, 1899 (N. Y.; U. S.); *Herb. Wight 1452*, British East India (N. Y.); *E. T. Heyde 334*, Guatemala, 1892 (U. S.); *idem et Lux 3793*, alt. 3,000 feet, Río de Las Cañas, Department of Santa Rosa, Guatemala, September, 1892 (Chi.; Gray; N. Y.; U. S.); *A. S. Hitchcock 17549*, Issorora, Aruka River, Lat. 8° 10′ N., Long. 59° 50′ W. (northern South America), January 16–17, 1920 (Gray; N. Y.; U. S.); *I. F. Holton 269*, La Paila, Colombia, April 25, 1853 (N. Y.; Phila.); *Horne 96*, near Caney, Santiago, Cuba, September 4, 1905 (U. S.); *W. Jameson 60*, Quilichao, Ecuador (U. S.); *Johnson*, Porto Rico (N. Y.); *E. P. Killip 3134*, dry plains, Chivi-Chivi, Panama, October 11, 1917 (U. S.); *idem et T. Hazen 8375*, field, 900–920 meters, Zarzal, Department of El Valle, Colombia, July 20, 1922 (N. Y.; U. S.); *E. P. Killip and A. C. Smith 15443*, growing 3–5 feet tall, alt. about 980 meters, vicinity of Piedecuesta, Department of Santander, Colombia, December 19–24, 1926 (Gray; N. Y.; U. S.); *O. Kuntze 204*, Caguay, Porto Rico, March 7, 1874 (N. Y.); *idem 803*, Trinidad, West Indies, April, 1874 (N. Y.); *F. C. Lehmann 7491*, alt. 1,000 meters, forests of Cerrito in State of Cauca, Colombia, July (N. Y.); *E. C. Leonard 7435*, alt. about 350 meters, field, north side of Mt. Lalidie, vicinity of St. Michel de l'Atalaye, Department du Nord, Haiti, November 23, 1925 (N. Y.; U. S.); *P. Levy 224*, alt. 100 meters, uncultivated savannas, Ile d'Omotepe, Nicaragua, October, 1869 (Del.); *A. Loher 3627*, San Francisco, central Luzon, Philippine

Isls. (U. S.); *J. F. Macbride 2656*, savannas, Panama, February 22, 1923 (Field; U. S.); *L. Mangubat 509*, Is. Balabac, Philippine Isls., March–April, 1906 (N. Y.; U. S.); *R. C. McGregor 64*, Manila, Luzon, Philippine Isls., October–December, 1904 (U. S.); *E. D. Merrill 1346*, Antipolo, Province of Rizal, Luzon, February, 1903 (N. Y.; U. S.); *idem 3646*, Caloocan, Province of Rizal, Luzon, November, 1903 (N. Y.; U. S.); *G. S. Miller 14*, Montserrat, West Indies, February 10, 1924 (U. S.); *J. G. Ortega 5966*, Mazatlán, State of Sinaloa, Mexico, 1925 (U. S.); *E. Otto 303*, Cuba (Gray); *E. Palmer 333*, alt. about 350 meters, vicinity of Gómez Farias, State of Tamaulipas, Mexico, April 13–21, 1907 (Field; Calif.; Gray; N. Y.; U. S.); *Paulay*, vicinity of Pamplemousses, Mauritius, May, 1887 (Mus. V.); *F. W. Pennell 4156*, alt. 40–70 meters, Los Hurtados, on the Río Sinu, Department of Bolívar, Colombia, February 4, 1918 (N. Y.); *idem 6195*, alt. 1,090 meters, roadside, Palmira, Department of El Valle, State of Cauca, Colombia, May 26–30, 1922 (Gray; N. Y.; U. S.); *C. V. Piper 5531*, Empire to Mandinga, Canal Zone, Panama, February 23, 1923 (Gray; U. S.); *H. Pittier 2152*, alt. 50–150 meters, fields and waste places, around Culebra, Canal Zone, Panama, January 1, 1911 (U. S.); *idem 2246*, alt. 10–30 meters, between Gorgona and Mamei, Canal Zone, Panama, January, 1911 (Gray; U. S.); *idem 9644*, San Juan del Norte, Nicaragua, June, 1895 (U. S.); *idem 9905*, growing 1 meter tall, alt. 800–1,000 meters, El Tasón, near El Valle, Federal District, Venezuela, November 12, 1921 (Gray; N. Y.); *idem 16432*, coffee plantations, alt. 900 meters, Nuestro Amo, Turrúcares, Costa Rica, September 15, 1902 (Del., 2 sheets); *C. L. Pollard, E. Palmer, & W. Palmer 188*, vicinity of Baracoa, Province of Santiago, Cuba, February 1–7, 1902 (Gray; N. Y.; Phila.; U. S.); *C. A. Purpus 6685*, in the sand of the river, Finca Mexiquito, State of Chiapas, Mexico, July, 1913 (Calif.); *idem 8703*, Zacualpan, State of Vera Cruz, Mexico, October, 1921 (Calif.); *M. Ramos 1471*, Bosoboso, Rizal Province, Luzon, Philippine Isls., September, 1906 (N. Y.; U. S.); *idem et Edano*, Jolo, Sulu Province, Philippine Isls., September 10, 1924 (Calif.); *iidem*, Alabat Is., Tayabas Province, Philippine Isls., October 18, 1926 (Calif.); *E. M. Reineck*, shady places in the harbor district, Porto Alegre, State of Rio Grande do Sul, Brazil, February 16, 1899 (U. V.); *A. E. Ricksecker 18*, Bassin, St. Croix, West Indies, October 23, 1895 (N. Y.); *C. B. Robinson 1837*, Amboina, Molucca Isls., July–November, 1903 (U. S.); *J. N. Rose, A. Pachano, & G. Rose 23367*, between Loja and Portovelo, Ecuador, October 3–6, 1918 (N. Y.; U. S.); *J. N. Rose & P. G. Russell 19658*, vicinity of Bahia, Brazil, May 27, 1915 (U. S.); *iidem et W. R. Fitch 3338*, Halliday Hill, Antigua, West Indies, February 7, 1913 (N. Y.; U. S.); *iidem 4373*, Sánchez, Santo Domingo, April 2, 1913 (N. Y.; U. S.); *J. T. Rothrock 353*, alt. 2,000–3,500 feet, Blue Mts., Jamaica, December 12, 1890 (Penn.); *J. N. Rovirosa 626*, Mexico, October 7, 1889 (N. Y.; Phila.; U. S.; cempoalillo incolarum); *Rugel 135*, in uncultivated valleys, Yumury, Cuba, 1849 (N. Y.); *H. H. Rusby & F. W. Pennell 527*, alt. 700–1,500 meters, Quebrada, Department of Huila, Colombia, July 31, 1917 (N. Y.); *H. H. Rusby & R. W. Squires 231*,

Catalina, lower Orinoco River, May, 1896 (Gray; N. Y.; Phila.; U. S.; U. V.); *J. A. Samuels 335*, road to Kwatta, Paramaribo, Dutch Guiana, June 7, 1916 (Gray; N. Y.); *L. Schlim 199*, alt. 3,500 feet, Ocaña, Province de Ocaña, Colombia, October, 1850 (Del., 2 sheets); *J. A. Shafer 123*, roadside near Grove and Richmond, Montserrat, West Indies, January 21, 1907 (N. Y.; U. S.); *idem 2353*, moist ground, Isabel Segunda to Campo Cielo, Vieques Is., Porto Rico, January 24, 1914 (N. Y.; U. S.); *idem 7692*, growing 3–4 feet tall, vicinity of Baracoa, Province of Oriente, Cuba, November 30, 1910 (N. Y.); *idem 11833*, San Juan de Zayas to San Gabriel, Province of Pinar del Río, Cuba, January 17–18, 1912 (Gray; N. Y.; U. S.); *idem 12079*, roadside, vicinity of Sanctus Spiritus, Province of Santa Clara, Cuba, February 15–24, 1912 (N. Y.); *P. Sintenis 112*, on hills about Mayagüez, Porto Rico, October 27, 1881 (N. Y.; U. S.); *idem 112b*, at margins of forests, Maricao, Porto Rico, November 16, 1884 (U. S.); *idem 5187*, on slopes at Buena Vista, Division of Humacao, Porto Rico, September 29, 1886 (U. S.; U. V.); *H. H. Smith 602*, alt. 100 feet, Santa Marta, Colombia, February, 1898–1901 (Gray; N. Y., 2 sheets; Phila.; U. S.); *idem* (similiter) *602*, rare in clearings below 3,000 feet, Bonda, Onaca, etc., vicinity of Santa Marta, July–August, 1898–99 (N. Y.); *idem et G. W. Smith 3*, alt. 800 feet, St. Vincent, West Indies, April–November (Gray); *P. C. Standley 19550*, alt. 650–850 meters, vicinity of San Salvador, Salvador, December 20, 1921–January 4, 1922 (Gray; U. S.); *idem 29029*, moist thicket, along old Las Cruces Trail, between Fort Clayton and Corozal, Panama, December 31, 1923 (U. S.; clavellina incolarum); *idem 30409*, growing 3–5 feet tall, on brushy slope, between France Field, Canal Zone and Catival, Province of Colón, Panama, January 9, 1924 (U. S.); *idem 31069*, growing 3–5 feet tall, in wooded swamp, vicinity of Fort Sherman, Canal Zone, Panama, January 15, 1924 (U. S.); *R. A. Toro 549*, Titiribi, vicinity of Medellín, Colombia, August 20, 1927 (N. Y.); *Trinidad Botanical Gardens (herb. No.) 2579*, Trinidad, West Indies (U. S.); *O. E. White 2100*, alt. 400 feet, woodlands, Cachuela Esperanza, Bolivia, March 7, 1921 (U. S.); *idem* (similiter) *2100*, alt. 300 feet, weed along path in sun, Cachuela Esperanza, Bolivia, March 7, 1922 (N. Y.); *A. E. Wight 32*, on cultivated lowlands, Port Antonio, Jamaica, January 6, 1906 (N. Y.); *P. Wilson 9438*, dry hillside, Bahía Honda, Province of Pinar del Río, Cuba, December 18–19, 1910 (N. Y.); *C. Wright 318*, eastern Cuba, 1856–57 (Gray; Phila.); *H. Wydler 137*, Porto Rico, 1827 (N. Y.).

7. **Cosmos bipinnatus** Cav. Icon. et Descr. 1: 10. *pl. 14*. 1791; *Coreopsis formosa* Bonato Pisaura, Autom. Cor. Form. 22. 1793; *Cosmea bipinnata* Willd. Sp. Pl. 3: 2250. 1803; *Georgia bipinnata* Spreng. Syst. Veg. 3: 611. 1826; *Cosmos tenuifolius* Lindl. Bot. Reg. *pl. 2007*. 1837; *Cosmea tenuifolia* Lindl. ex Heynhold, Nom. 223. 1840; *Bidens formosa* Schz. Bip. in Seem. Bot. Voy. Herald 307. 1852–57; *B. Lindleii* Schz. Bip. loc. cit.; *B. Lindleyi* Schz. Bip. ex Ind. Kew. 1: 301. 1895.

Achaenia aristata.....*Cosmos bipinnatus* sensu stricto.

Achaenia exaristata.....var. *exaristatus*.

Herba annua, erecta, ramosa, nunc glaberrima nunc minute scabrido-pubescens, 0.6–2 m. alta. Folia sessilia vel breviter (plerumque usque ad 7 mm.) alato-petiolata, plerumque 6–11 cm. longa, segmentis anguste linearibus vel subcapillaceis, 0.5–3 cm. longis et 0.4–1.2 mm. latis, apice acutis induratisque. Capitula moderate numerosa, pedunculata pedunculis tenuibus usque ad 2 dm. longis, pansa ad anthesin (3–) 4.5–8 cm. lata et 0.8–1.5 cm. alta. Involucri bracteae exteriores circ. 8, lanceolato-subulatae, 5–7-nervatae, superne saepe ciliatae, 9–13 mm. longae, interioribus ovato-lanceolatis subaequales. Flores ligulati plerumque 8, rosacei vel lilacini, ligula obovati, apice subtruncato plus minusve dentati, usque ad 3 cm. longi et usque ad 1.8 cm. lati. Paleae diaphanae superne caudato-elongatae cauda saepius aurea rarius atro-brunnea. Achaenia plus minusve linearia, nunc brevia clavataque nunc fusiformia ac supra tenuissime elongato-rostrata rostro angustissimo, atra, subacriter tetragona unaquaque facierum 1-sulcata, corpore vero glabra vel tuberculata circ. 6–10 mm. longa et circ. 1 mm. crassa, rostro plerumque erecto-hispida, omnino (aristis exclusis) 7–16 mm. longis, plerumque 2- raro 3-aristata aristis tenuibus retrorsum hamosis saepius 1–1.5 mm. longis.

Type specimen: No particular specimen cited. Cavanilles' original description was drawn from plants of Mexican origin which flowered at the Royal Garden of Madrid in October, November, and December, in the years 1789 and 1790.

Distribution: Arizona southeastward into the states of Puebla and Michoacán, Mexico; elsewhere (Maine, Florida, Cuba, Japan, etc.) adventive or cultivated.

Specimens examined:[1] *Andrieux 360*, Mexico, 1833 (Del.); *Brother Arsène 522*, alt. 2,170 meters, road to the Cimitière de la Piedad, vicinity of Puebla, State of Puebla, Mexico, September 29, 1906 (N. Y.; U. S.); *idem 522a*, Laguna de San Baltasar, vicinity of Puebla, State of Puebla, October 25, 1906 (U. S.); *idem 2429*, alt. 1,900 meters, ravine northwest of Punguato, vicinity of Morelia, State of Michoacán, Mexico, September 2, 1909 (U. S.); *idem 5425*, alt. 2,050 meters, Loma Santa María, vicinity of Morelia, State of Michoacán, September 17, 1910 (Gray; N. Y.; U. S.); *E. Bourgeau 845*, fields, Mexico, September 6, 1866 (Gray; U. S.); *S. Brown, N. L. Britton, & P. Bissett 1983*, in garden, Bermuda, West Indies, May 22–June 6, 1914 (N. Y.); *C. Y. Chiao*, cult., Nanking, Kiangsu Province, China, October 29, 1926 (Calif.); *T. Coulter 384*, Mexico (Gray; N. Y.; Phila.); *J. Gregg 65*, Mexico, 1848–49 (Gray); *L. Hahn*, Mexico, 1865–66 (U. V.); *K. Ichikawa 112* (distrib. *T. Tanaka*),

[1] There is a possibility that two or three of the collections cited here have achenes of the exaristate type and should be referred therefore to the var. *exaristatus* DC. (q.v.). At the time of my first listing collections of this species I inclined toward ignoring this variety.

cult. Fukuoka Prefecture, Hikosan Township, Tagawa County, Japan, October 8, 1925 (Calif.); *idem 951*, cult., eodem loco et tempore (Calif.); *E. W. Nelson 30*, north slope of Volcán Toluca, State of Mexico, Mexico, September 9, 1893 (U. S.); *Brother Nicolás*, alt. 2,000 meters, on bank of Alseseca River, State of Puebla, Mexico, September 1, 1909 (Del.); *idem*, Rancho Posadas near Puebla, State of Puebla, September 25, 1909 (U. S.); *E. Palmer*, Arizona, 1869 (Phila.); *idem 574*, vicinity of Durango, Durango, Mexico, April–November, 1896 (Calif.; Field, 3 sheets; Gray; N. Y.; U. S.); *idem 623*, fields, fence rows, and gardens, Guadalajara, State of Jalisco, Mexico, September, 1886 (Gray; N. Y.; Phila.; U. S.; U. V.); *idem 699*, eodem loco, October, 1886 (Gray; U. S.); *J. C. Parlin*, wool waste, North Berwick, Maine, 1904 (Gray); *C. G. Pringle 6590*, alt. 7,500 feet, valley of Mexico, Federal District, Mexico, September 19, 1896 (Calif.; Field, 2 sheets; Gray; N. Y.; Phila.; U. S.; U. V.); *idem 13036*, alt. 7,300 feet, fields about Lechería, State of Mexico, Mexico, September 30, 1904 (Field; Gray; U. S.); *C. A. Purpus 1552*, alt. 8,000–9,000 feet, barley fields, Mt. Ixtaccihuatl, Mexico, October, 1905 (Calif.; Field); *E. M. Reineck*, on rubbish-covered places, Porto Alegre, State of Rio Grande do Sul, Brazil, February 9, 1898 (U. V.); *J. N. Rose 2197*, in the Sierra Madre, near Santa Teresa, Territory of Tepic, Mexico, August 11, 1897 (U. S.); *idem 2762*, near Plateado, State of Zacatecas, September 2, 1897 (Gray; U. S.); *idem 3642*, Plateado, State of Zacatecas, September 3, 1897 (U. S.); *idem et J. H. Painter 7818*, near Flor María, State of Mexico, Mexico, October 13, 1903 (U. S.); *J. G. Schaffner*, valley of Mexico, Federal District, Mexico, August, 1855 (Gray); *W. Schumann 8*, river bank and pond, Mexico, September 21, 1884 (Field; U. S.); *J. K. Small 8637*, pine lands, Redland District, Dade County, Florida, May 13, 1918 (N. Y.); *H. A. Van Hermann 364*, Santiago de las Vegas, Province of Havana, Cuba, December 15, 1904 (N. Y.).

This and its var. *exaristatus*, both handsome plants, are now cultivated widely for ornament. Early flowering dwarfed forms are seen in many gardens and the range of ray colors is from an intense wine-red through various shades of red and pink to a pure white. The last is the var. *albiflorus* Sprenger, Bull. R. Soc. Tosc. Ort. 15: 356. 1890. Recently semi-double heads have been produced and are common in cultivation.

Cosmos bipinnatus var. **exaristatus** DC. Prodr. 5: 606. 1836.

Achaenia apice calva.

Type specimen: Collected by Humboldt and Bonpland, at altitude of 6,000 feet, in meadows near Pátzcuaro (Pázcuaro, Pézcuaro), State of Michoacán, Mexico, September, 1803.[1]

Distribution: In southern Mexico from the states of Michoacán and Mexico southeastward into (fide citationis a DeCandolleo plantae

[1] Type should be in the official set of Humboldt and Bonpland plants at Paris.

exsicc. Andrieuxii *numeri 307*) the State of Oaxaca. Elsewhere (California, South Carolina, etc.) doubtless always adventive or escaped from cultivation. Apparently commoner in cultivation than the species proper.

Specimens examined: *Virlet d'Aoust 174*, Mexico, 1851 (Par.); *Aschenborn 393*, Mexico (Par.); *Berlandier 938*, San Angel, Federal District, Mexico, September (Mo.); *ex herb. J. Davis 5010*, private garden, Anderson, South Carolina, October 1, 1920 (Mo.); *W. Schaffner 156*, fields at Santa Fe, Federal District, Mexico, September, 1854 (Par.); *ex herb. F. Wislizenus 1187*, Pomona, California, 1895 (Mo.).

Cosmos hybridus Hort. (ex Gard. & Forest 1: 474. 1888), raised in gardens at Newport, Rhode Island, was evidently a derivative of *C. bipinnatus* Cav. (plantis 6–8 pedibus altis; capitulis numerosissimis circ. 6–6.5 cm. latis parce suaveolentibus; radiis candidis vel pallido-rosaceis, marginalibus, crispis fimbriatisque). Information as to its parentage was said to be completely lacking, although a so-called *C. tenuissimus* (nom. nudum) was mentioned as a possible parent.

Cosmos spectabilis (Hort. ex Carr., Rev. Hortic. 64: 372. *figs. 114–115* and *plate*. 1892) with its two vars. *alba* and *rosea*, was suspected by Carriere to have been of hybrid origin. It appears to be a mere horticultural name for a form of *C. bipinnatus* Cav.

8. **Cosmos parviflorus** (Jacq.) HBK. Nov. Gen. et Sp. 4: 189 (241). 1820; *Coreopsis parviflora* Jacq. Hort. Schoenbr. 3: 65 and *pl. 374*. 1798; *Cosmea parviflora* Willd. Sp. Pl. 3: 2250. 1804; *Cosmos parviflorus* Pers. Syn. 2: 477. 1807; *Cosmos bipinnatus* var. *parviflorus* Gray, Pl. Wright. 2: 90. 1853; *Bidens Humboldtii* Schz. Bip. in Seem. Bot. Voy. Herald 307. 1852–57.

Herba annua, erecta, gracilis, supra saepe ramosa, 3–9 dm. alta, caule nunc pubescenti nunc glabrato, sulcato. Folia parce petiolata petiolis alato-marginatis usque ad circ. 5 mm. longis, tota longitudine 3–7 cm. longa, bipinnata, segmentis angustissime linearibus tantum 0.1–0.6 mm. latis, faciebus glabris marginibus saepe valde spinuloso-ciliatis, apice acutis vel subobtusis costis omnibus vix notabiliter alatis. Capitula singillatim pedunculos interdum tenuissimos plerumque 1–3 dm. longos terminantia, pansa ad anthesin 1.5–2.5 cm. lata et 6–9 mm. alta. Involucri bracteae exteriores plerumque 8, lanceolato-acuminatae vel lineari-elongatae, saepe patentes vel etiam reflexae, tergo viridi 3–5-atro-nervatae, maximam partem vel omnino glabrae, apice acuto induratae, 6–9 mm. longae; interiores oblongae, acutae, exterioribus paulo breviores, atrovirentes cum oris superne albidis. Flores ligulati circ. 8, albidi vel rosacei, ligula plus minusve cuneato-obovati, apice 2–3-dentati, 5–9 mm. longi; tubulosi lutei. Achaenia subfusiformia, linearia, rotundato-tetragona, atra vel brunneo-atra, unaquaque facierum 1-sulcata, breviter erecto-

setulosa, superne subito angustata ac saepius rostrata, corpore (rostro adjecto) 9–16 mm. longa et 1–1.3 mm. crassa, apice 2–4-aristata aristis erectis, retrorsum hamosis, circ. 2 mm. longis.

Type specimen: Raised from seed of unknown origin, in the Garden of Schönbrunn, Vienna, Austria, and represented by Jacquin's type plate.

Distribution: Texas, Colorado, and Arizona, southward throughout Mexico (including Lower California) as far as the states of Puebla and Michoacán. Adventive on wool waste in Massachusetts and Maine.

Specimens examined: *Bro. Anect 30*, vicinity of Las Vegas, New Mexico, September, 1919 (Gray; N. Y.; U. S.); *idem 85*, eodem loco et tempore (U. S.); *idem 214*, eodem loco, October, 1919 (Gray; U. S.); *anon.*, cult., Paris, France, 1818 (Gray); *Bro. Arsène*, alt. 2,194 meters, Cerro Tijocate, vicinity of Morelia, State of Michoacán, Mexico, September 20, 1909 (U. S.); *idem 348*, alt. 2,194 meters, Rancho Posada, vicinity of Puebla, State of Puebla, Mexico, September 20, 1909 (U. S., 2 sheets); *idem 2560*, alt. 2,000 meters, eodem loco, September 15, 1909 (U. S.); *idem 5199*, alt. 1,950 meters, Loma Santa María, vicinity of Morelia, eodem tempore (N. Y.; U. S.); *idem 5461*, alt. 2,000 meters, Punguato, vicinity of Morelia, August 18, 1910 (Gray; U. S.); *idem 17315*, alt. 1,950 meters, southeast of Las Vegas, New Mexico, September 2, 1926 (Mo.); *Florence Beckwith 237*, Stonewall, Colorado, August, 1917 N. (Y.); *J. M. Bigelow*, Laguna Blanca, New Mexico, 1853–54 (U. S.); *J. C. Blumer 22*, Fort Bayard Watershed, Grant County, New Mexico, August 27, 1905 (Gray; U. S.); *idem 163*, eodem loco, September 3, 1905 (Gray; N. Y.; U. S.); *idem 1419*, alt. 8,000–8,250 feet, pine land recently lumbered, Barfoot Park, Chiricahua Mts., Arizona, September 24, 1906 (Gray); *idem 1624*, alt. 7,500 feet, Goldenrod Park, Chiricahua Mts., August 23, 1907 (Gray; N. Y.; U. S.); *idem 3321*, alt. 7,400 feet, Spud Ranch, Rincon Mts., Arizona, September 3, 1909 (Calif.; Gray); *T. S. Brandegee*, cult., 1895 (Calif.); *idem*, Sierra de la Laguna, Lower California, October 20, 1893 (Calif.); *I. W. Clokey 4369*, alt. 2,040 meters, dry hills, Rye, Colorado, September 3, 1921 (N. Y.; Phila.; U. S.); *T. D. A. Cockerell*, garden at Santa Fe, New Mexico, September, 1897 (N. Y.); *M. P. Dehesa 1556*, ravine, Concordia, State of Sinaloa, Mexico, September, 1919 (U. S.); *Miss L. L. Donnelly*, alt. 6,100 feet, Cananea, State of Sonora, Mexico, September 1, 1909 (Calif.); *W. W. Eggleston 10809*, alt. 2,480 meters, Barfoot Fire Station to Paradise, Cochise County, Chiricahua National Forest, Arizona, September 23, 1914 (Gray; U. S.); *idem 14233*, alt. 1,800 meters, above Silver Creek, Coronado Forest, Cochise County, September 29, 1917 (Gray); *idem 15999*, alt. 2,130 meters, Pinos Altos, Gila Forest, Grant County, New Mexico, September 18, 1919 (Phila.); *Charlotte C. Ellis 280*, alt. 8,200 feet, cultivated soil, Balsam Park, Sandia Mts., New Mexico, August 4–7, 1914 (U. S., 2 sheets); *C. Ehrenberg 434*, Mexico (Gray); *G. Engelmann*, Hot Springs Canyon, Las Vegas, New Mexico,

September 12, 1881 (Mo.); *A. Fendler 447*, woods west of Las Vegas, August 14, 1847 (Gray; Mo.); *idem 448*, bottom lands of Santa Fe Creek, New Mexico, October 20, 1846 (Mo.); *R. S. Ferris & C. D. Duncan 2541*, common, Livermore Peak, Davis Mts., Texas, July 9–12, 1921 (N. Y.); *E. L. Greene*, vicinity of Santa Rita del Cobre, New Mexico, 1880 (Phila.); *D. Griffiths 7222*, north slope of Santa Rita Mts., Arizona, September 13–21, 1901 (Mo.); *idem et J. J. Thornber 109*, Santa Rita Mts., September 20–October 4, 1902 (U. S.); *C. V. Hartman 563*, Guajochic, State of Chihuahua, Mexico, September 8, 1892 (Gray); *idem 794*, mountain near Pilares, State of Chihuahua, September 18, 1891 (Calif., 2 sheets; Gray; N. Y.; Penn.; U. S.); *V. Havard 5*, 1–2 feet tall, south of Marfa, Texas, October, 1883 (Gray); *idem 8*, near creek, Limpia Mts., Texas, July, 1883 (Gray; U. S.); *A. A. & E. G. Heller 3789*, alt. 7,300 feet, between Santa Fe and Canoncito, New Mexico, June 29, 1897 (Gray; N. Y.; U. S.); *C. L. Herrick 617*, Hop Canyon, Magdalena Mts., New Mexico, August, 1895 (U. S.); *J. M. Holzinger*, Hanover Mt., southwestern New Mexico, July 31, 1911 (U. S.); *F. X. Holzner 2011*, Huachuca Mts., Arizona, August 23, 1893 (U. S.); *Hort. Cantabrigensis*, e sem. a *C. Wrightio* in New Mexico lectis cult. anno 1852 (N. Y.) et 1853 (Gray); *M. E. Jones*, alt. 5,500 feet, Huachuca Mts., Arizona, September 2, 1903 (U. S.); *idem 4305*, Bowie, Arizona, September 20, 1884 (U. S.); *J. G. Lemmon*, Rucker Valley, Chiricahua Mts., Arizona, September, 1881 (Calif., 2 sheets); *idem 2765½*, Tanner's Canyon at mill, Huachuca Mts., Arizona, August, 1882 (Calif.; Gray; U. S.); *F. E. Lowe*, from wool waste, North Worcester, Massachusetts, September 24, 1920 (Gray); *E. A. Mearns 1963*, Huachuca Mts., Arizona, August 21, 1893 (N. Y.); *idem 2143*, base of San Luis Mts. up to 6,000 feet, United States–Mexican boundary, September 5, 1893 (U. S.); *O. B. Metcalfe 596*, alt. about 7,500 feet, Mogollon Mts., Socorro County, New Mexico, August 25, 1903 (Gray; N. Y.; U. S.); *idem 1303*, alt. about 6,600 feet, wet gravelly soil, Kingston, New Mexico (Gray; N. Y.; U. S.); *A. I. Mulford 1275*, Whitman's Camp, New Mexico, September 8, 1895 (N. Y.); *G. C. Nealley 219*, Arizona, 1891 (N. Y.; U. S.); *E. W. Nelson 4817*, alt. 8,000 feet, on Sierra Madre, 40 miles from Guadalupe y Calvo, southwestern Chihuahua, Mexico, August 21, 1898 (Gray; U. S.); *idem 6179*, near Colonia García, in the Sierra Madre, State of Chihuahua, August 1–20, 1899 (Gray; U. S.); *Fr. Nicolás*, Rancho Posada, near Puebla, State of Puebla, Mexico, September 20, 1909 (U. S.); *E. Palmer*, Arizona, 1869 (U. S.); *idem 109*, Alvarez, State of San Luis Potosí, Mexico, September 5–10, 1902 (Calif.; Gray; N. Y.; U. S.); *idem 579*, rich, moist bottom lands, City of Durango and vicinity, State of Durango, Mexico, September, 1896 (Calif.; Gray; N. Y.; U. S., 2 sheets); *idem 580*, eodem loco et tempore (Calif.; Gray; U. S.); *idem 588*, alt. about 15 meters, vicinity of Tampico, State of Tamaulipas, Mexico, April 27–30, 1910 (U. S.); *idem 699*, Guadalajara, State of Jalisco, Mexico, October, 1886 (Gray); *idem 1852*, Tepic, Territory of Tepic, Mexico, January 5–February 6, 1892 (Gray); *J. C. Parlin 1526*, on wool waste heap,

North Berwick, Maine, September 10, 1902 (Gray, 2 sheets); *Parry & Palmer 482*, central Mexico, 1878 (Gray; Phila.; U. S.); *R. H. Peebles & G. J. Harrison 4736*, Patagonia Mts., Arizona, August 28, 1927 (U. S.); *H. A. Pilsbry*, alt. 8,000–11,000 feet, Black Range, around heads of Animas Canyon, Sierra County, New Mexico, September 10–18, 1915 (Phila.); *idem*, alt. 9,000–11,000 feet, between Sawyer's Peak and Hillsboro Peak, summit of Black Range, New Mexico, August 25–September 10, 1916 (Phila.); *F. G. Plummer*, alt. 7,300 feet, along creek, vicinity of Lincoln National Forest, New Mexico, 1903 (U. S.); *C. G. Pringle*, Arizona, June 24, 1882 (N. Y.); *idem 599*, near City of Chihuahua, State of Chihuahua, Mexico, September 29, 1885 (Gray); *idem 1298*, pine plains, base of the Sierra Madre, State of Chihuahua, September 29, 1887 (Gray; N. Y., 2 sheets; Phila.; U. S.; U. V.); *idem 1644*, base of the Sierra Madre, State of Chihuahua, October 7, 1888 (Calif.; N. Y.; U. V.); *idem 6572*, alt. 7,300 feet, lava beds, Pedregal, Federal District, Mexico, October 10, 1896 (Calif.; Gray; N. Y.; Phila.; U. S.; U. V., 2 sheets); *idem 11509*, alt. 7,000 feet, rocky hills near El Salto Station, State of Hidalgo, Mexico (Gray; U. S.); *C. A. Purpus 38*, Sunset Mts., Arizona, May–October, 1902 (U. S.); *idem 1552*, alt. 8,000–9,000 feet, barley fields, Ixtaccihuatl, Mexico (Gray); *idem 8119*, Flagstaff, Arizona, May–October, 1900 (Calif.; U. S.); *J. N. Rose & W. R. Fitch 17550*, vicinity of Raton, New Mexico, September 27, 1913 (U. S.); *J. N. Rose & J. H. Painter 7293*, Sierra de Guadalupe, State of Mexico, Mexico, September, 1903 (N. Y.; U. S.); *J. Rothrock 639*, Sonoita Valley, Arizona, August, 1874 (Gray, 2 sheets; U. S.); *H. H. Rusby 220*, hillsides, Mogollon Mts., New Mexico, August 31, 1881 (N. Y.; Penn.); *J. G. Schaffner 201*, sandy places about City of San Luis Potosí, State of San Luis Potosí, Mexico, August, 1876 (Gray); *idem 255*, near San Angel, Federal District, Mexico, September, 1855 (Gray); *Schiede*, Mexico (Gray); *Josephine Skehan 110*, Gray, New Mexico, August 31, 1898 (Calif.; Gray; N. Y., 2 sheets; U. S., 2 sheets); *F. H. Snow*, Hermit's Peak, New Mexico, August (U. S.); *P. C. Standley 5137*, alt. about 6,700 feet, near Pecos, New Mexico, August 20, 1908 (Gray; N. Y.; U. S.); *idem 13794*, alt. 2,200–2,900 meters, roadside, vicinity of Ute Park, New Mexico, August 25, 1916 (U. S.); *Mrs. O. St. John 105*, Vermejo Park, New Mexico, July, 1894 (Gray); *G. Thurber 1006*, State of Sonora, Mexico, September, 1851 (Gray, 2 sheets); *J. W. Toumey*, Prescott, Arizona, August 27, 1894 (Calif.); *Townsend & Barber 213*, alt. 7,500 feet, near Colonia García, Sierra Madre, State of Chihuahua, Mexico, August 1, 1899 (Calif.; Gray; N. Y.; U. S.; U. V.); *G. R. Vasey*, Kingman, Arizona, 1881 (U. S.); *T. E. Wilcox*, near Fort Huachuca, Arizona, 1891 (U. S.); *idem*, Fort Huachuca, September, 1892 (N. Y.) and September, 1893 (N. Y.); *idem 399*, near Fort Huachuca, September, 1894 (U. S.); *A. Wislizenus 200*, plains and mountains, State of Chihuahua, Mexico, October 5, 1846 (Mo.); *N. P. Woodward*, wool waste, North Worcester, Massachusetts, September 29, 1917 (Gray); *E. O. Wooton*, alt. 6,400 feet, Wingfields Ranch, along Ruidoso Creek, Lincoln County, New

Mexico, July 8, 1895 (Gray; N. Y.); *idem*, Tularosa Creek, Otero County, New Mexico, August 18, 1899 (N. Y.; U. S.); *idem*, Willow Creek, Socorro County, New Mexico, August 8, 1900 (U. S.); *idem 243*, alt. 6,300–7,000 feet, Lincoln County, New Mexico, July 30, 1897 (Calif.; Gray; N. Y.; U. S.; U. V.); *idem et P. C. Standley*, alt. about 5,600 feet, Dona Ana County, New Mexico, September 23, 1906 (U. S.); *iidem 3554*, alt. about 7,400 feet, Lincoln County, New Mexico, August 25, 1907 (U. S.); *C. Wright 1238*, State of Sonora, Mexico, 1851 (Calif.; Gray; U. S.); *Mary S. Young*, abundant in moist canyons, Davis Mts., Texas, August, 1914 (Gray); *eadem 66*, Mt. Livermore, Davis Mts., August 18, 1914 (Mo.).

Sect. II. **Klibea.**[1]—Herbae verisimiliter omnes annuae. Flores ligulati rosacei vel flavi. Achaenia valde obcompressa, alata vel exalata, superne rostrata, aristata aristis sursum hispidulis. (Numeri 9 et 10.)

9. **Cosmos exiguus** Gray, Proc. Amer. Acad. 22: 429. 1887.

Herba annua, erecta, gracillima, glabra, caule saepius filiformi, simplici vel pauciramoso, 2–6 dm. alto. Folia indivisa, fere filiformia, lamina ipsa (costa mediana supra vix infra moderatim exorta) membranacea, margine integra ac saepe obscure revoluta, apice acuta, 1–4 (rariter –8) cm. longa et plerumque 0.5–1 mm. lata. Capitula solitaria pedunculos plerumque 1–5 tenuissimos 4–8 cm. longos terminantia, aegre radiata, pauciflora, pansa ad anthesin tantum circ. 4–7 mm. lata et 6–8 mm. alta. Involucri praecipue ad basim hispidi bracteae exteriores circ. 4–6, lato-subulatae, adpressae, irregulariter 1–4 mm. longae; interiores oblongae, apicem angustatum versus ciliatae, 4–8 mm. longae. Flores ligulati 4–6, purpurei vel atro-rosacei, minuti, ligula irregulariter truncato-obovati, apice circ. 3-dentati, tubo (ipso circ. 2 mm. longo) incluso tantum circ. 4 mm. longi; ovario rudimentario demum stramineo et valde filiformi, supra sparsim erecto-setoso, circ. 5 mm. longo. Achaenia saepius 4–7, tenuissime linearia, obcompressa, unica facie (omnino 2 faciebus) circ. 4-sulcata, infra atra et glabrata, supra brunnea et perspicue erecto-setosa et attenuato-rostrata, corpore 1.2–1.9 cm. longa et 0.6–0.8 mm. lata, apice biaristata aristis tenuissimis, sursum hirtello-barbellatis, 1.5–3 mm. longis.

Type specimen: Collected by Edward Palmer, *No. 559*, among grass and rocks, Río Blanco near Guadalajara, State of Jalisco, Mexico, June–October, 1886 (Gray).

Distribution: In western Mexico from the State of Sinaloa southeastward to the State of Michoacán.

Specimens examined: *C. R. Barnes & W. J. G. Land 296*, alt. 5,900 feet, dry hills, road to Santo Domingo Mine, Etzatlán, State of Jalisco, October 6, 1908 (Chi.); *T. S. Brandegee*, Cerro Colorado,

[1]Sectio nov. Name anagrammatic, alluding to *C. Blakei*, which is included here.

Cofradía, vicinity of Culiacán, State of Sinaloa, November 3, 1904 (Calif.; Gray; U. S.); *E. Palmer 559* (type, Gray; cotypes, N. Y.; Phila.; U. S.; U. V.); *C. G. Pringle 2492*, rocky hills near Guadalajara, State of Jalisco, October 14, 1889 (Calif.; Field; Gray; Phila.; U. S.; U. V.); *idem 11508*, alt. 5,000 feet, eodem loco, September 30, 1903 (Field; Gray; U. S.); *idem 13037*, alt. 6,000 feet, hills above Uruapan, State of Michoacán, October, 1904 (Field; Gray; U. S.); *J. N. Rose 2943*, Bolaños, State of Jalisco, September 10–19, 1897 (Gray; U. S.); *idem et J. H. Painter 7475*, near Guadalajara, State of Jalisco, September 30, 1903 (U. S.).

10. **Cosmos Blakei** Sherff, Bot. Gaz. 82: 334. *pl. 22.* 1926.

Herba erecta, verisimiliter annua, infra glabra, supra pubescens, caule obscure tetragono, internodiis longo, tantum moderate ramoso, + 5 dm. alto (radice non visa). Folia tenuiter petiolata petiolis 1.5 cm. longis, petiolo adjecto ± 1 dm. longa, bipinnatisecta segmentis linearibus, acriter apiculatis, minute hispidis ac spinuloso-ciliatis, 0.5–1.5 mm. latis. Capitula ramos terminantia, robuste pedunculata pedunculis usque ad 1.2 dm. longis, pansa ad anthesin ± 2.5 cm. lata et ± 1 cm. alta. Involucrum pubescens, plus minusve campanulatum bracteis exterioribus spathulatis et supra saepe late rotundo-dilatatis, marginibus ciliatis apice aegre mucronatis, 4–6 mm. longis; interioribus multo majoribus, in sicco perspicue subflavis, late lanceolatis, ad apicem angustatum saepe minute glandulo-ciliatis, circ. 1 cm. longis. Flores ligulati circ. 10–12, flavi, circ. 1.5 cm. longi; ovario lineari, membranaceo, sterili, in sicco nitido-albescenti, marginibus et supra ad costam medianam erecto-hispido, corpore circ. 1 cm. longo, apice erecto-hispido et aegre aristato 1–2 aristis tenuibus sursum hispidis ± 0.5 mm. longis. Flores disci corolla tantum circ. 5 mm. longi, flavi. Achaenia valde obcompressa et infra circumambitu (alis latis inclusis) perspicue oblanceolata, faciebus atro-brunneis glaberrima vel supra et ad costam medianam erecto-setosa, marginibus straminea et setis spinulosis minute erecto-ciliata, supra cervicata cervice substraminea erecto-ciliata plerumque 3–7 mm. longa, tota longitudine (usque ad cervicis apicem) 1.4–2.4 cm., latitudine (alis inclusis) 2.7–3.4 mm.; apice erecto-hispida et biaristata aristis erectis vel parce divergentibus, tenuibus, sursum hispidis, 1.5–2.5 mm. longis.

Type specimen: Collected by Bernoulli and Cario, *No. 1476*, Retalhuleu, Guatemala, January, 1871 (Kew).

Distribution: Known only from type locality of Retalhuleu, Guatemala.

Specimens examined: *Bernoulli & Cario 1476* (type, Kew; cotype, Petrop.).

Sect. III. **Mesinenia.**[1]—Herbae perennes, erectae, basi lignescentes itaque plus minusve incrassatae. Flores ligulati flavi, rosei,

[1] Sectio nov. Name anagrammatic, alluding to the widely used name *C. Seemannii*, which is found reducible to *C. carvifolius*.

violacei, etc., numquam albi. Achaenia plerumque tetragona, numquam alata, cervicibus raro attenuato-elongatis, apice saepius aristata aristis retrorsum hamosis. (Numeri 11–15.)

11. **Cosmos Landii** Sherff, Bot. Gaz. 64: 29. 1917; *Bidens Palmeri* Gray, Proc. Amer. Acad. 22: 429. 1887.

Herba perennis, erecta, rigida, infra suffruticosa, prorsus glaberrima; caulibus gracilibus, striato-angulatis, 6–10 dm. altis. Folia petiolata petiolis alato-marginatis circ. 6–14 mm. longis, petiolo adjecto 3–7 cm. longa, circumambitu late triangulata, pinnatim 5–9-partita, segmentis linearibus, apice acutissimis vel mucronatis, margine revolutis et non manifeste ciliatis, medio unicostatis costa infra valde perspicua, basaliter ad rhachidem late alatam decurrentibus, 1–2 mm. latis, inferioribus quandoque irregulariter bi- vel trifidis. Capitula solitaria pedunculos tenues 3–13 dm. longos terminantia, pansa ad anthesin 2.5–3.5 cm. lata et 1–1.5 cm. alta. Involucri glabri bracteae exteriores 6–8, lineares vel parce lineari-lanceolatae, superne usque ad apicem acutum sensim angustatae, saepius patentes, 3–5 mm. longae; interiores plus minusve oblongo-lanceolatae, apicaliter obtusae, 8–10 mm. longae. Flores ligulati circ. 5, aurei, ligula obovati, apice plerumque 3-dentati dentibus acutis, circ. 1.3–1.7 cm. longi et 7–9 mm. lati. Achaenia linearia, plus minusve tetragona angulis rotundatis, atra, unaquaque facierum 1–2-sulcata, nunc erostrata nunc moderatim rostrata, infra saepius sparsim breviterque et supra saepius dense perspicueque erecto-setosa, corpore 1–1.4 cm. longa et 1–1.2 mm. crassa et paleas demum saepius vix superantia, apice 2–4-aristata aristis parce tenuibus, patentibus, retrorsum hamosis, usque ad 3 mm. longis.

Type specimen: Collected by Edward Palmer, *No. 315*, very common on hillsides, Río Blanco near Guadalajara, State of Jalisco, Mexico, August, 1886 (Gray).

Distribution: Known only from the State of Jalisco, Mexico.

Specimens examined: *C. R. Barnes & W. J. G. Land 164*, alt. 5,600 feet, Sierra de San Esteban, State of Jalisco, September 28, 1908 (Field); *iidem 167*, eodem loco et tempore (Chi.; Field); *iidem 189*, eodem loco (sed 5,700 pedibus) et tempore (Field); *E. Palmer*, Mexico, 1895 (U. S.); *idem 315* (type, Gray; cotypes, Phila.; U. S.; U. V.); *idem 3066*, between Bolaños and Guadalajara, State of Jalisco, September 22, 1897 (U. S.); *C. G. Pringle 2348*, vicinity of Guadalajara, State of Jalisco, November 2, 1889 (Chi.; Del.; Field; Gray; Phila.; U. S.; U. V., 2 sheets); *idem 11490*, alt. 5,000 feet, banks of ravines, Río Blanco near Guadalajara, State of Jalisco, October 6, 1903 (Field; Gray; U. S.); *J. N. Rose*, cult. e sem. in Mexico lectis, 1898 (U. S.).

12. **Cosmos Langlassei** (Sherff), comb. nov.; *Bidens Langlassei* Sherff, Bot. Gaz. 64: 24. 1917.

Herba perennis, gracilis, 8–10 dm. alta, parce ramosa; caule glabra, acute et perspicuissime quadrangulata, basi tumida et lignea.

Folia petiolata petiolis 3–7 mm. longis plus minusve hispido-ciliatis, petiolo adjecto 2.5–5.5 cm. longa, pariter 2.5–5.5 cm. lata, bi- vel tripinnata (summa pinnata vel indivisa), supra glabra, margine hispidulo-ciliata, infra remotissime hispida, ultimis segmentis linearissimis, 0.5–1 mm. latis, integris, acute apiculatis. Capitula tenuiter pedunculata pedunculis usque ad 11 cm. longis, pansa ad anthesin 2.5–3 cm. lata et 0.8–1.1 cm. alta. Involucrum basi sparsim hispidum, bracteis exterioribus 12–16, linearissimis, fere glabris, apicaliter capillaribus acribusque, 6–7 mm. longis; interioribus linearibus, circ. 3 mm. longis. Flores ligulati circ. 7 vel 8, flavi, ligula anguste elliptici, 7–15-striata, ad apicem denticulati, circ. 1.5 cm. longi. Ovaria (achaeniis maturis non visis) 1–1.3 mm. longa, subplana, apice annulo 10–15 setulorum coronato.

Type specimen: Collected by E. Langlassé, *No. 332*, in clay soil at altitude of 1,200 meters, Le Faixin, southern Mexico, September 8, 1898 (Gray).

Distribution: Known only from type locality of Le Faixin in southern Mexico.

Specimens examined: *E. Langlassé 332* (type, Gray; cotypes, Kew; U. S.).

A little known species, collected by Langlassé during his exploration of the states of Guerrero and Michoacán. It was formerly placed provisionally by me in *Bidens* until mature achenes could be found. My thought was that they might prove to be rostrate, in which case the affinity with *Cosmos* could be confirmed. Subsequent studies have shown, however, that certain species or varieties of undisputed *Cosmos* material have erostrate achenes (e.g., *C. calvus*). Hence the general habit, which is more that of *Cosmos* than of *Bidens*, is here taken as the generic criterion, and a transfer of the species to *Cosmos* is considered imperative irrespectively of whether the achenes shall have been proved to be rostrate or not.

13. **Cosmos crithmifolius** HBK. Nov. Gen. et Sp. 4: 190 (242). 1820; *Cosmea crithmifolia* Spreng. Syst. Veg. 3: 615. 1826; *Bidens Sartorii* Schz. Bip. in Seemann, Bot. Voy. Herald 307. 1852–57; *B. valladolidensis* Schz. Bip. in Seemann, loc. cit. 308.

Herba perennis, erecta, maximam partem glaberrima, rigida, caule basim versus lignescente, alibi herbaceo, (saepe pallido-) viridi, perspicue 4- vel 6-angulato et plus minusve sulcato, interdum ramoso ramis erectis vel suberectis, 6–10 dm. alto. Folia petiolata petiolis alatis 1–2 (–2.8) cm. longis, petiolo adjecto 5–14 cm. longa, principalia plerumque pinnatim 3–7-partita, segmentis oppositis vel suboppositis anguste linearibus, integerrimis (vel terminali inferioribusque raro bifidis), crassiusculis, infra saepe rubescentibus et obsolete adpresso-hispidis, apice acerrimis, margine subrevolutis et saepe minutissime spinuloso-ciliatis, basi ad rhachidem alatam decurrentibus, 1–2 (rariter –2.5) mm. latis. Capitula pauca (saepius

tantum 1–7), tenuiter pedunculata pedunculis usque ad 1.3 dm. longis, pansa ad anthesin 3–5 cm. lata et 1–1.8 cm. alta. Involucri bracteae exteriores 7–12 (raro duabus seriebus imbricatae, primariae) lanceolato-subulatae, glabrae, apice induratae, circ. 4–6 (vel demum etiam –10) mm. longae, interiores late oblongae, apice pubescentes et saepe obtusae, 8–14 mm. longae. Flores ligulati 5 vel 6, rosei vel purpurascentes, ligula late obovati, apice circ. 3-dentati, 1.5–2.5 cm. longi. Achaenia linearia, atro-brunnea, quadrangulata angulis rotundatis, unaquaque facierum plerumque 1-sulcata, apicem versus angustata sed non perspicue rostrata, infra sparsim supra valde erecto-setosa, corpore 1.1–1.6 cm. longa et 0.5–1 mm. crassa, apice 3–5-aristata aristis tenuibus usque ad 5.5 mm. longis, retrorsum hamosis.

Type specimen: Collected by Humboldt and Bonpland, at altitude of 6,000 feet, Valladolid [de Mechoacan] (i.e., Morelia), State of Michoacán, Mexico, September, 1803 (Par.).

Distribution: In southern Mexico northward to the Territory of Tepic, the State of Jalisco, and the region of Mt. Orizaba; also in Guatemala and Honduras.

Specimens examined: *Anon.*,[1] Barranca de Ybarra, near Guadalajara, State of Jalisco, September 6, 1892 (Chi.); *Andrieux 312*, Mexico, 1833 (Del., 2 sheets); *Fr. G. Arsène*, alt. 2,194 meters, Rancho Posada, vicinity of Puebla, State of Puebla, September 9, 1909 (U. S.); *idem*, alt. 2,300 meters, Cerro Azul, vicinity of Azul, near Morelia, State of Michoacán, November 4, 1909 (U. S.); *idem*, alt. 2,000 meters, Loma Santa María, Morelia, State of Michoacán, August 15, 1910 (Field); *idem*, alt. 1,950 meters, eodem loco, September 4, 1910 (U. S.); *idem 362*, alt. 2,194 meters, Rancho Posada, vicinity of Puebla, State of Puebla, September 25, 1909 (U. S.); *idem 2937*, alt. 1,950 meters, Loma Santa María, Morelia, State of Michoacán, August 15, 1909 (Mo.; U. S.); *idem 5863*, alt. 1,950 meters, eodem loco, October 28, 1910 (Mo.; N. Y.; U. S.); *idem 5938*, alt. 1,900 meters, eodem loco, 1910 (U. S.); *idem 6740*, alt. 2,200 meters, Cerro Azul, vicinity of Morelia, State of Michoacán, 1910 (U. S.); *C. Conzatti 712*, alt. 7,500 feet, Cerro San Felipe, State of Oaxaca, September 23, 1895 (Gray); *idem 1340*, alt. 2,600 meters, Santa Inés del Monte, Zimatlán, State of Oaxaca, December 8–9, 1905 (Gray); *idem 4162*, Cerro San Felipe, August 18, 1921 (U. S.); *T. Coulter 383*, Mexico (Gray); *H. Galeotti 2053*, alt. 5,000–8,000 feet, woods and prairies, Cordillera, State of Oaxaca, January–April, 1840 (Del.); *A. Ghiesbreght*, State of Oaxaca, October, 1842 (Del.); *idem 105*, Mexico (Gray; N. Y.); *idem 560*, flowering from July into November, in cold soil, mountain forests and particularly forests of *Pinus*, Chiapas, etc. (Gray; Mo.); *P. L. Jouy*, State of Jalisco, Mexico, 1892 (U. S.); *W. F. von Karwinski*, Mexico (Del.); *J. J. Linden*, forests of *Pinus*, State of Chiapas, February, 1840

[1] Perhaps Edward Palmer, who collected here or near here in earlier years (cf. Proc. Amer. Acad. 22: 396. 1887).

(Del.); *F. Müller 673*, Orizaba, August, 1853 (N. Y.; Petrop.); *E. W. Nelson 1376*, alt. 7,500–9,500 feet, 18 miles southwest of city of Oaxaca, State of Oaxaca, September 10–20, 1894 (U. S.); *idem 1436* and *1452*, alt. 5,500–7,500 feet, valley of Oaxaca, State of Oaxaca, September 20, 1894 (U. S.); *Parry & Palmer 485*, central Mexico, 1878 (Mo.; Phila.; U. S.); *iidem 485½*, eodem loco et tempore (Field; Gray; Mo., 2 sheets; N. Y.; U. S.); *C. G. Pringle 4259*, dry ledges, hills of Pátzcuaro, State of Michoacán, October 10, 1892 (Calif., 2 sheets; Chi.; Field; Gray; Mo.; N. Y.; Phila.; U. S.; U. V.); *idem 5062*, dry hills, eodem loco, November 24, 1891 (Gray); *idem 9887*, alt. 5,000 feet, gravelly banks near Guadalajara, State of Jalisco, August 12, 1902 (Field; Gray; Mo.; N. Y.; U. S.); *C. A. Purpus 9093*, Hacienda Monserrate, State of Chiapas, September, 1923 (Calif.; Field; Mo., 2 sheets; N. Y.; U. S.); *J. N. Rose 2955*, in the Sierra Madre, west of Bolaños, State of Jalisco, September 15–17, 1897 (Field; Gray; U. S.); *idem 3396*, in the Sierra Madre, near Santa Teresa, Territory of Tepic, August 10, 1897 (U. S.); *idem, J. H. Painter & J. S. Rose 9256*, Ajusco, Federal District, Mexico, August, 1905 (N. Y.; U. S.); *J. N. Rovirosa 906*, alt. 1,500 meters, Hacienda Santa Cruz, State of Chiapas, August 2, 1890 (Phila.); *A. E. Salazar 475*, common in moist, shady places, Quebrada de los Chiltes, San Ignacio, State of Sinaloa, August 14, 1918 (U. S.); *C. Sartorius*, Mirador, State of Vera Cruz (Par.; type of *Bidens Sartorii* Schz. Bip.); *W. C. Shannon 608*, alt. 7,000 feet, Amatenango, Department of Huehuetenango, Guatemala, December, 1891 (U. S.); *C. L. Smith 292*, alt. 7,000–8,000 feet, Sierra de San Felipe, State of Oaxaca, October, 1894 (Mo.; N. Y.; U. S.); *P. C. Standley 56245*, alt. 1,080–1,400 meters, forest of *Pinus*, vicinity of Siguatepeque, Department of Comayagua, Honduras, February 14–27, 1928 (Field).

14. **Cosmos linearifolius** (Schz. Bip.) Hemsl. Biol. Centr. Amer. Bot. 2: 200. 1881; *Bidens linearifolia* Schz. Bip. in Seemann, Bot. Voy. Herald 307. 1852–57.

Herba perennis, erecta, glabra, gracilis, caule striato, subtetragono, saepius simplici, circ. 6–9 dm. alto. Folia indivisa, linearia, crassiuscula, utrinque attenuata, apice acuta, plerumque 7–13 cm. longa, 2–5 mm. lata, marginibus minutissimo spinuloso-hispida, costa mediana gracillima et (etiam infra) non valde perspicua. Capitula pauca (plerumque 1–7), tenuiter pedunculata pedunculis usque ad 1.5 dm. longis, pansa ad anthesin 2.5–3.2 cm. lata et circ. 1.1–1.4 cm. alta. Involucri glabrati bracteae exteriores 5–7, late lanceolato-subulatae, supra saepe spinuloso-ciliatae, circ. 3–5 mm. longae, interiores oblongo-lanceolatae, 4–8 mm. longae. Flores ligulati 6–9, ligula plus minusve oblongo-oblanceolati, rosacei vel aegre purpurei, apice circ. 3-dentati, usque ad circ. 1.5 cm. longi. Achaenia fusiformia, brunnea vel badia, rotundo-tetragona, unaquaque facierum 1-sulcata, infra sparsim supra valde erecto-setosa, corpore 1.3–1.8 cm. longa et 1 mm. crassa, supra rostrata, apice 2–3-aristata aristis tenuibus, retrorsum hamosis, 2–3 mm. longis.

Type specimen: Collected by Berthold Seemann, *No. 2022*, in the Sierra Madre, northwest Mexico, November 25, 1849–February 22, 1850.[1]

Distribution: State of Chihuahua southward into the State of Michoacán, western Mexico.

Specimens examined: *Fr. G. Arsène*, Santa María, Morelia, State of Michoacán, August 15, 1910 (Del., 2 sheets); *E. A. Goldman 208*, alt. 5,500–6,500 feet, near Batopilas, State of Chihuahua, October 3–5, 1898 (Gray; N. Y.); *M. E. Jones*, alt. 5,000 feet, Guayanopa Canyon, State of Chihuahua, September 23, 1903 (Gray; N. Y.); *J. G. Ortega 4447*, alt. 300–600 meters, La Bajada Tamazula, State of Durango, November, 1921 (Gray; U. S.); *E. Palmer*, southwestern Chihuahua, August–November, 1885 (U. S.); *J. N. Rose 2154*, in the Sierra Madre near Santa Teresa, Territory of Tepic, August 9, 1897 (U. S.); *idem 3455*, in the Sierra Madre, Territory of Tepic, August 13, 1897 (U. S.); *A. E. Salazar 86*, moist, open places, not abundant, San Ignacio, State of Sinaloa, November, 1917 (U. S.); *B. Seemann 2022* (type material, Kew; Gray); *Townsend & Barber 386*, near Chuichupa in the Sierra Madre, northwestern Mexico, August 30, 1899 (Calif.; Gray; N. Y.; U. S.; U. V.).

15. **Cosmos carvifolius** Benth. Bot. Voy. Sulphur 117. 1844; *Bidens Seemannii* Schz. Bip. in Seem. Bot. Voy. Herald 307. 1852–57; *B. carvifolia* Schz. Bip. in Seem. loc. cit. 308; *Cosmos Seemannii* Gray, Proc. Amer. Acad. 19: 16. 1883; etiam ex Greenm., loc. cit. 41: 265. 1905; *Bidens Seemanii* Schz. Bip. ex Sherff, Bot. Gaz. 64: 28. 1917 (sphalm).

Herba perennis, erecta, gracilis, caule subtetragono, striato, minutissime scabrido-hispido, conferte foliato, plerumque non nisi summam versus ramoso, 5–8 dm. alto. Folia breviter petiolata petiolis moderatim linearibus circ. 4–7 mm. longis, petiolo adjecto 3–6.5 cm. longa, inferne internodia superantia, 1–3-pinnatisecta, segmentis angustissime linearibus, apice acutissimis, supra costa mediana marginibusque minutissime et oculis non manifeste spinuloso-hispidis, tantum circ. 0.2–0.5 mm. latis. Capitula plerumque circ. 3–11, tenuiter pedunculata pedunculis usque ad 2 dm. longis, pansa ad anthesin 2.5–4 cm. lata et 0.8–1.5 cm. alta. Involucri glabri bracteae exteriores circ. 8 vel 9, lineari-subulatae, 5–9 mm. longae, primo saepe adpressae, interiores late oblongo-lanceolatae, apicaliter obtusae, saepe purpurascentes, 8–11 mm. longae. Flores ligulati 5 vel 6, purpurei vel rosacei, ligula oblongo-oblanceolati, apice acriter 3-dentati, circ. 1.4–2.2 cm. longi. Achaenia plus minusve lineari-fusiformia, obtuse tetragona, griseo-brunnea, glabra, unaquaque facierum

[1] Some difference of opinion exists as to which of Seemann's plants are best taken as types (cf. Hemsley, Biol. Centr. Amer. Bot. 4: 132. 1887). In any case, "the first set of the Panama and Mexican collections is at Kew" (Hemsl., loc. cit.) and this contains a well-preserved specimen of *Seemann 2014*. Schultz Bipontinus perhaps retained a duplicate, or author's type, and this may be looked for in his private herbarium (Par.).

1- vel 2-sulcata, apicem versus non longissime rostrata, corpore circ. 1.1–1.4 cm. longa et 1.5–1.8 mm. crassa, apice nunc 4–6- nunc 6–8-aristata aristis erectis, retrorsum hamosis, circ. 2–3 mm. longis.

Type specimèn: Collected by George Barclay (Sulphur Expedition), Tepic, Territory of Tepic, Mexico, 1836–42 (Kew).

Distribution: In the Sierra Madre of northwestern Mexico and southeastward through the territory of Tepic into the State of Michoacán, Mexico.[1]

Specimens examined: *Brother Arsène*, Cerro San Miguel, Morelia, State of Michoacán, February, 1909 (Del.; Field; Phila.); *G. Barclay* (Voyage of the Sulphur), Tepic, Territory of Tepic, 1836–42 (type, Kew); *Ghiesbreght 264*, cold ground, September–October (Gray, 2 sheets); *Ynes Mexia 601*, common at alt. 1,000 meters, on open hillside, road from Tepic to Jalcojotán, State of Nayarit, September 15, 1926 (U. S.); *E. Palmer 1852*, Tepic, Territory of Tepic, January 5–February 6, 1892 (Field; N. Y.; U. S.); *C. G. Pringle 8845*, alt. 5,000 feet, in fields, Uruapan, State of Michoacán, October 8, 1904 (Carn.; Del.; Gray; Mo.; Phila.; U. S.); *J. N. Rose 3435*, in the Sierra Madre, near Santa Teresa, Territory of Tepic, August 11, 1897 (Field; U. S.); *B. Seemann 2014* (Voyage of the Herald), Sierra Madre, Mexico (Gray; Kew; type collection of *Cosmos Seemannii*).

I have already dealt with this species (Bot. Gaz. 88: 303. 1929). The type is a plant with a somewhat irregular growth habit and with more than the usual number of branches. Its numerous heads, or, rather, the ones still remaining, are rather stunted in size. The achenes are 5-aristate. *Palmer 1852*, from the type locality, has many achenes likewise 5-aristate, but a few 6- and some 4-aristate. The other specimens examined have the achenes commonly 6–8-aristate, but otherwise differ in no important respects.

Sect. IV. **Discopoda** (DC.), comb. nov.; pro sect. *Bidentis* DC. Prodr. 5: 604. 1836.—Herbae perennes, e radicibus tuberiformibus elongatis fasciculatisque adscendentes vel erectae. Folia caulina vel basalia. Flores ligulati rarissime albido-rosacei, plerumque rosei, violacei, lilacini, purpurei vel valde atro-purpurei. Achaenia inferne attenuata et basi ipsa in areolam orbiculatam obliquamque dilatata, superne elongato-rostrata, aristis retrorsum hamosis. (Numeri 16–26.)

16. **Cosmos Pringlei** Robins. & Fern. Proc. Amer. Acad. 44: 623. 1909.

Herba perennis e radicibus tuberiformibus crassiusculis erecta, 6–9 dm. alta; caule subtereti, simplici vel ramoso, griseo-puberulo vel -pulverulo, praecipue in media parte folioso. Folia petiolata petiolis alatis 0.5–1.5 (–2.3) cm. longis, petiolo adjecto 3–9 (–13) cm. longa,

[1] A specimen by Ghiesbreght, without locality, may have come even from the State of Chiapas (where Ghiesbreght collected very largely).

firmiuscula, ab indivisis lamina ovato-oblonga vel cuneato-rhomboidea supra medium dentata ad formas profunde partitas vel 1–2-pinnatifidas cum segmentis linearibus, integris, ciliatis, faciebus glabratis, supra pallido-viridibus, infra plerumque rubescentibus, apice obtusis acutisve variantia. Capitula pauca (1–5), pedunculata pedunculis tenuibus usque ad 3 dm. longis, pansa ad anthesin 6–8 cm. lata et 1.2–1.7 cm. alta. Involucri glabri bracteae exteriores plerumque 6 vel 7 rarius 8, oblongo-lanceolatae vel interdum lanceolato-subulatae, 5–8-nervatae, apice induratae, 7–11 mm. longae et 2–4 mm. latae, interioribus lanceolatis vel ovato-lanceolatis saepe aequales. Flores ligulati plerumque 8, pallide rosacei nec atropurpurei, ligula obovati, apice rotundato minutissime obsoletissimeque denticulati, 2–3.5 cm. longi et 1–1.9 cm. lati. Paleae (praesertim exteriores) lanceolatae ac valde diaphanae, flavido-striatae. Flores disci superne aurei. Achaenia tenuiter fusiformia, rotundato-tetragona, unaquaque facierum 1-sulcata, glabra vel breviter adpresso-hispida, subtus atra ac crassiora, supra elongato-rostrata ac saepe straminea, corpore (rostro incluso) 1.3–2.4 cm. longa, apice aristas binas arcuato-adscendentes retrorsum barbatas 2.5–5 mm. longas gerentia.

Type specimen: Collected by C. G. Pringle, *No. 1299*, on pine plains at base of the Sierra Madre, State of Chihuahua, Mexico, September 20, 1887 (Gray, 2 sheets).

Distribution: Along the Sierra Madre of northwestern Mexico, from northwestern Chihuahua southward into the Territory of Tepic.

Specimens examined: *E. W. Nelson 4853*, alt. 7,000–7,500 feet, base of Mt. Mohinora, 8 miles from Guadalupe y Calvo, State of Chihuahua, August 23–31, 1898 (Gray; U. S.); *idem 6097*, near Colonia García in the Sierra Madre, State of Chihuahua, August 25, 1899 (Gray; U. S.); *C. G. Pringle 1299* (type, Gray, 2 sheets; cotypes, N. Y., 2 sheets; Phila.; U. S., 2 sheets; U. V.); *J. N. Rose 2120*, between Santa Gertrudis and Santa Teresa in the Sierra Madre, Territory of Tepic, August 8, 1897 (U. S.); *C. H. T. Townsend & C. M. Barber 168*, alt. 7,500 feet, vicinity of Colonia García in the Sierra Madre, State of Chihuahua, July 26, 1899 (Del.; Field; Mo.; N. Y.; U. S.); *iidem 438*, vicinity of Casas Grandes, State of Chihuahua, August 15, 1899 (Calif.; Del.; Field; Gray; Mo.; N. Y.; U. S.; U. V.); *iidem 439*, alt. 6,000 feet, near Colonia García in the Sierra Madre, State of Chihuahua, August 22, 1899 (Mo., 2 sheets; N. Y.; U. S., 2 sheets).

17. **Cosmos Palmeri** Robins. Proc. Amer. Acad. 44: 623. 1909.

Folia pinnata vel bipinnatifida lobis linearibus. . . . . *C. Palmeri* sensu stricto.

Folia plerumque indivisa raro subtripartita, marginibus (saepe irregulariter) dentata. . . . . var. *odontophyllus*.

Herba perennis e radicibus 2–5 tuberiformibus graciliter fusiformibus elongatis 5–8 mm. crassis erecta, 3–6 dm. alta, caule tereti

puberulo vel subglabrato, vix ramoso. Folia parce petiolata petiolis alatis usque ad 8 mm. longis, petiolo adjecto 3–5 (–6) cm. longa, pinnata vel bipinnatifida, lobis linearibus 1-nerviis acutiusculis vel obtusis margine nervoque saepius breviter hispidulis, crassiusculis, faciebus (praecipue inferioribus) saepe brunneo-rubescentibus, 0.4–2.5 cm. longis et 1–3 (–5) mm. latis. Capitula solitaria longe tenuiterque pedunculata pedunculis 1.5–3.5 dm. longis, pansa ad anthesin 3.5–8 cm. lata et 1.3–1.8 cm. alta. Involucri glabri bracteae exteriores circ. 8, nunc subdeltoideo-ovatae nunc oblongo-lanceolatae, adscendentes vel saepe reflexae, virides, 6–10-atro-striatae, apice obtusiusculae ac paulo incrassatae, 4.5–8 mm. longae et 1.5–3 mm. latae; interiores ovato-oblongae, apice acutiusculae, usque ad 1.5 cm. longae et 5 mm. latae. Flores ligulati circ. 8, lilacini, ligula elliptici vel anguste obovati, apice circ. 3-dentati, 1.5–3.5 cm. longi et 6–17 mm. lati; tubulosi flavi. Achaenia linearia, tenuiter fusiformia, rotundato-tetragona, grisea brunneave, unaquaque facierum 1-sulcata, glabra vel supra costis aegre erecto-setulosa, apice biaristata aristis rectis 2–3 mm. longis retrorsum hamosis hamis raro solitariis saepissime 5–12.

Type specimen: Collected by Edward Palmer, *No. 388*, in "moist spots on hills and plains" at Otinapa, State of Durango, Mexico, July 25–August 5, 1906 (Gray).

Distribution: States of Durango and San Luis Potosí, and perhaps elsewhere, in northern to central Mexico.

Specimens examined: *P. I. García 314*, State of Durango (U. S.); *E. W. Nelson 4563*, near El Salto, State of Durango, July 12, 1898 (U. S.); *E. Palmer 388* (type, Gray; cotypes, Mo.; N. Y.; U. S.); *idem et C. C. Parry 483 pro parte*, central Mexico, 1878 (Mo.); *J. N. Rose 2355*, State of Durango, August 16, 1897 (U. S.); *J. G. Schaffner 200 pro parte*, shady places near San Miguelito, State of San Luis Potosí, September, 1876 (Gray); *idem* (similiter) *200*, State of San Luis Potosí, 1878 (N. Y.); *idem 641*, eodem loco, October, 1879 (U. S.).

Cosmos Palmeri var. **odontophyllus**, var. nov.—A specie foliis plerumque indivisis lamina rhomboideo-obovatis apicem versus irregulariter dentatis basim versus late cuneatis integrisve differt.

Type specimen: Collected by J. G. Schaffner, *No. 200 pro parte*, in shady places near San Miguelito, State of San Luis Potosí, Mexico, September, 1876 (Gray, cum specie ipsa commixta).

Distribution: Known only from the State of San Luis Potosí, Mexico.

Specimens examined: *C. C. Parry & Edward Palmer 483 pro parte*, central Mexico, 1878 (U. S.); *J. G. Schaffner 200 pro parte* (type, Gray); *idem* (similiter) *200*, State of San Luis Potosí, 1878 (N. Y.); *idem* (similiter) *200 (641)*, in mountains at San Miguelito, State of San Luis Potosí, October, 1879 (N. Y.; U. S., cum specie ipsa commixta).

18. **Cosmos montanus**, sp. nov.

Folia indivisa vel usque ad tripartita.....*C. montanus* sensu stricto.

Folia pinnata foliolis plerumque 2-jugis.....var. *pinnatus*.

Herba perennis, e radicibus tuberosis fasciculatisque erecta, gracilis, simplex vel moderate ramosa caule subangulato striatoque, glabra, ± 6–7 dm. alta. Folia nunc pedatim tripartita, petiolata petiolis alatis 1–2 cm. longis, petiolo adjecto 4–7 cm. longa, nunc unico latere lobo laterali instructa, nunc indivisa; laminis vel segmentis linearibus vel oblanceolatis vel cuneato-oblanceolatis, membranaceis, minutissime revolutis spinuloso-ciliatisque, integris vel interdum paucidentatis, apice subacutis, faciebus viridibus vel infra rubescentibus, unico segmento plerumque 3–6 mm. lato, folii integri tota lamina etiam 1.5 cm. lata. Capitula pauca, tenuiter pedunculata pedunculis 1–2 dm. longis, pansa ad anthesin 3–4 cm. lata et 1.2–1.4 cm. alta. Involucri glabri bracteae exteriores 7–9, lineares, crassiusculae, 3–5-nervatae, apice subobtusae, 7–10 mm. longae, quam interiores lanceolatae plerumque parce breviores. Flores ligulati 6–8, atro-purpurei, ligula obovati, apice integri vel obscure lobulati, 1.4–1.8 cm. longi et 8–11 mm. lati; tubulosi omnino flavi. Achaenia fusiformia, linearia, atra, rotundo-tetragona, unaquaque facierum 1-sulcata, glabra vel apicem versus minute erecto-setosa, erostrata vel subrostrata, corpore 8–10 mm. longa et 1–1.3 mm. lata, apice biaristata aristis retrorsum hamosis circ. 2 mm. longis.

Type specimen: Collected by J. N. Rose, *No. 3469*, in the Sierra Madre, State of Durango, Mexico, August 13, 1897 (U. S.).

Distribution: In the mountains of the Sierra Madre, State of Durango, southward to State of Zacatecas and Territory of Tepic, Mexico.

Specimens examined: *J. N. Rose*, near San Juan Capistrano, State of Zacatecas, August 18, 1897 (U. S.); *idem 3433*, in the Sierra Madre, near Santa Teresa, Territory of Tepic, August, 1897 (Field); *idem 3469* (type, U. S.; cotype, Field).

Has been confused in herbaria with *Cosmos scabiosoides* HBK., from which it can readily be distinguished by its different foliar habit, its entirely yellow disk florets, etc.

Cosmos montanus var. **pinnatus**, var. nov.—A specie foliis pinnatis foliolis plerumque 2-jugis differt.

Type specimen: Collected by J. N. Rose, near Santa Teresa, in the Sierra Madre, Territory of Tepic, Mexico, August 12, 1897 (U. S.).

Distribution: Known only from type locality in Territory of Tepic, Mexico.

Specimens examined: *J. N. Rose*, near Santa Teresa, etc. (type, U. S.).

The type plant is nearly 5 dm. high, and has three slender peduncles 7.5–11 cm. long, one fully expanded flowering head 5.5 cm. wide, the

apparently 8 rays widely obovate, broadly but obscurely 3-lobed at apex, the yellow disk flowers not purplish at the top. The leaf segments are entire, mainly 2–3.5 mm. wide and 1.5–3.5 cm. long, at the apex indurated and subacute; their midrib stramineous, on lower surface emergent and conspicuous.

19. **Cosmos concolor**, sp. nov.

Herba gracilis, perennis, e radicibus paucis tuberiformibus elongatis fasciculatis erecta, caule simplici, tereti, hispidulo, circ. 5 dm. alto. Folia non numerosa (circ. 4- vel 5-jugis), vix petiolata petiolis alatis circ. 3–7 mm. longis, petiolo adjecto 3–5 cm. lata, pinnata vel bipinnatisecta, segmentis primariis linearibus, uninervatis, glabris vel costa mediana ac marginibus subrevolutis incrassatisque interdum obscure spinuloso-hispidulis, 1.5–2.5 (–3) cm. longis et 1.5–3.5 (–4.2) mm. latis, lateralibus saepius 2-jugis, inferioribus interdum rursus lobatis. Capitula solitaria tenuiter pedunculata pedunculis ± 2 dm. longis, pansa ad anthesin circ. 3.5–4 cm. lata et 1.2–1.4 cm. alta. Involucri glabri bracteae exteriores ± 7, oblongo-lanceolatae, apice purpurascentes induratae subacutaeque, tergo 7–10-nervatae, circ. 6–7 mm. longae; interiores oblongae, purpurascentes, circ. 8–9 mm. longae. Flores ligulati circ. 8, anguste obovati, atropurpurei, apice saepe acriter bidenticulati, 1.5–2 cm. longi; tubulosi similiter atropurpurei vel inferne interdum ecolorati. Achaenia immatura lineari-fusiformia, rotundato-tetragona, unaquaque facierum 1-sulcata, maximam partem glabra, cervice sparsissime setulosa, corpore circ. 9 mm. longa apice biaristata aristis subrectis retrorsum hamosis circ. 2 mm. longis.

Type specimen: Collected by J. N. Rose, *No. 2353*, State of Durango, Mexico, August 16, 1897 (Gray).

Distribution: Known only from states of Durango and Zacatecas, Mexico.

Specimens examined: *J. N. Rose*, in the Sierra Madre, State of Zacatecas, August 17, 1897 (U. S.); *idem 2353* (type, Gray; cotype, U. S.).

20. **Cosmos scabiosoides** HBK. Nov. Gen. et Sp. 4: 190 (242). 1820; *Cosmea scabiosae* Spreng. Syst. 3: 615. 1826; *C. scabiosoides* HBK. ex Heynhold, Nom. 223. 1840; *Bidens scabiosoides* Schz. Bip. in Seem. Bot. Voy. Herald 308. 1852–57; *Cosmos scabiosoides* var. *typicus*, infra.

Foliorum pinnatorum vel raro subpinnatorum segmenta ultima plerumque lanceolato- vel ovato-oblonga, saepius integra.

var. *oblonga*.

Foliorum lamina vel segmenta diversa.

C. scabiosoides sensu stricto (i.e., var. *typicus*) et f. *indivisus*.

Herba perennis, erecta, e radicibus tuberosis fasciculatisque, 7–13 dm. alta, caule subtetragono, ramoso, raro glabrato saepissime

pubescenti. Folia saepius petiolata pinnatipartitaque, petiolo plano plus minusve alato-marginato usque ad 1.5 cm. longo adjecto 4–10 cm. longa, firmiuscula, foliolis vel laciniis 3–5, sessilibus, circumambitu diversissimis (nunc sublinearibus, nunc lanceolatis, nunc rhomboideis, etc.), infra medium cuneato-angustatis et in rhachidem decurrentibus, supra medium saepius serratis, ad apicem acutis ac saepius acuminatis, supra viridibus glabratisque, subtus interdum subrubescentibus et praecipue ad nervos hispidis, margine ciliatis; saepe nonnullis laminis indivisis, nunc lanceolatis nunc lanceolato-ovatis nunc etiam cuneato-obovatis, integriusculis vel irregulariter serratis. Capitula usque ad circ. 15, pedunculata pedunculis tenuibus usque ad 2 (raro –3) dm. longis, pansa ad anthesin 2.5–3.5 cm. lata et 1–1.4 cm. alta. Involucri glabri bracteae exteriores circ. 8, primo adpressae, demum patentes, lineari-lanceolatae, virides, circ. 5–7-striatae striis saepius purpureis, apice parce acuto nitidae induratae-que, 3–5 mm. longae, quam interiores purpurascentes dimidio breviores. Flores ligulati circ. 8, atro-purpurei, ligula obovati, apice rotundato saepius 3-dentati dentibus obtusis, 1–1.5 cm. longi. Paleae lineares vel lanceolatae, atro-striatae, aliter flavidae. Flores disci crebri, flavi, glabri; dentibus ovatis, obtusis, purpureis. Achaenia tenuiter fusiformia, rotundato-tetragona, unaquaque facierum 1-sulcata, glabra, infra crassiuscula et atra, supra elongato-rostrata ac brunnescentia, corpore 1.2–2 cm. longa et 0.8–1 mm. lata, apice biaristata aristis tenuibus retrorsum hamosis, 2.5–3.5 mm. longis, demum patentibus reflexisve et interdum deciduis.

Type specimen: Collected by Humboldt and Bonpland, at altitude of 6,780 feet, on the western slope of the Mechoacan (Michoacán) Mountains, near Pázcuaro (Pátzcuaro, Pézcuaro), State of Michoacán, Mexico, September, 1803.[1]

Distribution: In Mexico, from the states of Michoacán and Mexico eastward to Mt. Orizaba and southeastward through the states of Morelos and Puebla even into Chiapas.

Specimens examined: *Brother G. Arsène*, Cerro Azul near Morelia, State of Michoacán, April, 1909 (Field); *idem 5517*, alt. 2,200 meters, eodem loco, September 1, 1910 (Field, 2 sheets; Mo.; U. S.); *idem 5603 pro parte*, alt. 2,500 meters, Dos Teteras (vicinity of Morelia), State of Michoacán, October 26, 1911 (Mo., cum var. *oblonga* commixta); *idem 10128*, alt. 2,330 meters, Cerro Tepoxuchitl, vicinity of Puebla, State of Puebla, July 11, 1907 (U. S.); *E. Bourgeau 549*, Santa Fe, Federal District, July 26, 1866 (Gray; N. Y.; U. S.); *idem 2930*, Escamella, vicinity of Mt. Orizaba, September 1–2, 1866 (Del., 2 sheets; N. Y.; U. V.); *T. Coulter 390*, Mexico (Gray; N. Y.); *C. A. Ehrenberg 366*, Mexico (Gray); *Mr. & Mrs. J. G. Lemmon 90*, valley of Mexico, Federal District, 1905 (Calif., 2 sheets); *F. M. Liebmann 617*, Chinantla, State of Puebla (Gray; Par., 2 sheets; U. S.); *F. Müller 1177*, Mexico (Par.); *idem 1899*, Mexico, August,

[1] Type is doubtless still preserved in the official Humboldt and Bonpland set at Paris.

1853 (N. Y.); *Brother Nicolás*, Guadalupe, State of Puebla, 1910 (Field); *idem 5438*, alt. 2,330 meters, Cerro Tepoxuchitl, vicinity of Puebla, State of Puebla, August 20, 1910 (Mo.; U. S.); *C. R. Orcutt 4378*, The Park, Morelos, State of Morelos, September 3, 1910 (Mo.); *C. C. Parry & E. Palmer 483*, Mexico, 1878 (Gray); *C. G. Pringle 3589 pro parte*, wooded hills, Pátzcuaro, State of Michoacán, October 23, 1890 (Gray); *idem 4263 pro parte*, hills of Pátzcuaro, October 11, 1892 (Calif., 2 sheets; Chi.; Field; Gray; N. Y.; Phila.; U. S.); *idem 9888*, alt. 8,500 feet, hills near Ozumba, State of Mexico, November 4, 1902 (Field; Gray; N. Y.; U. S.); *C. A. Purpus 1551*, alt. 7,000–8,000 feet, hillsides and open woods, Salto de Agua, State of Chiapas, November, 1905 (Calif.; Field; Gray; N. Y.; U. S.; U. V., 2 sheets); *J. N. Rose & J. H. Painter 6514*, near Santa Fe, Federal District, August 22, 1903 (U. S.); *iidem 7994*, eodem loco, October 18, 1903 (U. S.); *J. G. Schaffner 3*, near Mecameca, Mt. Popocatapetl, August 18, 1855 (Par.); *idem* 39, alt. 8,000 feet, near Guapimalpán, September, 1855 (Gray; Par.).

Coreopsis crassifolia Sesse & Moc. (Fl. Mex. edit. 2: 194. 1894. *Nec alior.*), a species from the mountains of Temascaltepec in the State of Mexico, Mexico, may belong here.

Cosmos scabiosoides var. **typicus**[1] f. **indivisus** Robinson, Proc. Amer. Acad. 44: 624. 1909.

Folia indivisa integriuscula vel irregulariter serrata lanceolata vel lanceolato-ovata vel etiam cuneato-obovata.

Type specimen: Collected by C. G. Pringle, *No. 4263 pro parte*, hills of Pátzcuaro, State of Michoacán, October 11, 1892 (Gray).

Distribution: The states of Michoacán and Jalisco, northward into the State of Zacatecas and the Territory of Tepic, Mexico.

Specimens examined: *Brother G. Arsène*, alt. 2,300 meters, Cerro Azul, vicinity of Morelia, State of Michoacán, September 15, 1909 (U. S.); *idem*, alt. 2,050 meters, Loma Santa María, vicinity of Morelia, September 17, 1910 (U. S.); *C. G. Pringle 4263 pro parte* (type, Gray; cotypes, Field; U. V.); *J. N. Rose*, in the Sierra Madre, State of Zacatecas, August 17, 1897 (U. S.); *idem 2957*, in the Sierra Madre, west of Bolaños, State of Jalisco, September 15–17, 1897 (U. S.); *idem 3433*, in the Sierra Madre, near Santa Teresa, Territory of Tepic, August 11, 1897 (U. S.).

A form with a geographic range extending northwestward from that of the species proper. Plants from Michoacán show so many foliage intergradations with the species (var. *typicus*) that the rank of forma appears best suited to the plants with simple leaves.

Cosmos scabiosoides var. **oblongus**, var. nov.—A var. *typica* foliorum segmentis plerumque lanceolato- vel ovato-oblongis differt.

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[1] Var. nov.

Type specimen: Collected by Brother G. Arsène, *No. 5794*, at altitude of 2,800 meters, Quinceo (vicinity of Morelia), State of Michoacán, Mexico, 1910 (U. S.).

Distribution: Known only from type locality in State of Michoacán, Mexico.

Specimens examined: *Brother G. Arsène 5603 pro parte*, alt. 2,500 meters, Dos Teteras (vicinity of Morelia), State of Michoacán, October 26, 1911 (Mo., cum var. *typica* commixta; U. S.); *idem 5794* (type, U. S.; cotype, Mo.).

Has a foliar appearance simulating more or less that of *C. Nelsonii*.

21. **Cosmos purpureus** (DC.) Benth. & Hook. f. ex Hemsl. Biol. Centr. Amer. Bot. 2: 200. 1881; *Bidens purpurea* DC. Prodr. 5: 604. 1836; *B. purpurea* var. *glabriuscula* DC. loc. cit.; *Coreopsis purpurea* Moc. & Sess. ex DC. loc. cit.; *Cosmos Uhdeanus* Kunth & Bouché ex Kunth, Ind. Sem. Hort. Berol. 12. 1846 (ex descript.); Walp. Repert. 6: 721. 1847.

Herba perennis, adscendens vel erecta, e radicibus fasciculatis ac tuberoso-incrassatis, 0.9–2.5 m. alta, caule subtetragono, sulcato, purpurascenti, piloso-hirto, subsimplici, ramis glabratis. Folia petiolata petiolis vix marginatis 0.5–1.5 cm. longis, petiolo adjecto 5–9 cm. longa et 4–8 cm. lata, circumambitu deltoidea, bipinnatifida principalium foliolis 2- vel 3-jugis, membranacea, segmentis saepius ovato-oblongis, apice abrupte acutis et calloso-mucronatis, plerisque 1–2 cm. longis et 5–14 mm. latis, integris vel plus minusve lobatis, supra viridibus et obscure puberulis subtus nervisque hirto-pilosiusculis et saepius rubescentibus, minutissime glanduloso-rugosis, margine scabriusculo-ciliatis, basi cuneato-decurrentibus. Capitula saepius 5–9, tenuiter pedunculata pedunculis usque ad 2 dm. longis, pansa ad anthesin 3.8–4.3 cm. lata et circ. 1.1–1.5 cm. alta. Involucri campanulati bracteae exteriores circ. 8, lineares, sursum sensim attenuata, apice angustae sed non acres, glabrae, 3–5-viridi-nervati, 6–8 mm. longae et 1–1.3 mm. latae; interiores oblongo-lanceolatae, crebre striatae, margine tenues et plerumque pallidiores quam exteriores manifeste longiores. Flores ligulati circ. 8, ligula obovati, purpurei vel atro-purpurei, apice integri, 1.5–2 cm. longi et 7–9 mm. lati; tubulosi valde atropurpurei, antheris linearibus atro-brunneis. Achaenia graciliter fusiformia, glabra, griseo-brunnea, rotundo-tetragona, unaquaque facierum profunde 1-sulcata, corpore circ. 12–13 mm. longa et circ. 1.3–1.5 mm. lata, paleas diaphanas apicem versus purpurascentes vix aequantia, plerumque vix rostrata, aristis 2, saepe purpurascentibus, tenuibus, retrorsum hamosis, 2–3 mm. longis, demum saepe caducis.

Type specimen: Collected by J. L. Berlandier, *No. 1007*, on the western slopes of the Cordillera de Guchilaque (C. de Guichilaca, near Cuernavaca, State of Morelos), Mexico, October, 1827 (Del.).

Distribution: From the states of Morelos and Mexico, eastward to the State of Vera Cruz, southeastern Mexico.

Specimens examined: *Adole*, State of Vera Cruz, October, 1910 (Field); *J. L. Berlandier 985*, Cordillera de Guchilaque (near Cuernavaca, State of Morelos; Del.); *idem 1007* (type and two cotypes, Del.); *idem 1021 pro parte*, Cordillera de Guchilaque, October, 1827 (Del., ex num. cotype of *Bidens purpurea* var. *glabriuscula* DC.); *idem 1163*, Tolucca (Toluca), State of Mexico (Del.); *ex Hort. Berol.*, October, 1857 (Par.; sub nom. *C. atropurpureo* Kunth); *C. G. Pringle 8238*, alt. 6,500 feet, growing 3–8 feet tall from tuberous-thickened, fascicled roots, mountains above Cuernavaca, State of Morelos, September 30, 1899 (Calif.; Field; Gray; N. Y.; Phila.; U. S., etc.).

The original materials of *Cosmos Uhdeanus* Kunth & Bouché have not been seen by me,[1] but the description is fairly satisfactory and leaves no doubt as to which of the species of *Cosmos* was intended. Robinson (Proc. Amer. Acad. 44: 623. 1909) has properly associated with this name *Pringle 8238*, a handsome plant liberally represented in the larger herbaria, and matched, further, by a beautiful specimen collected more recently by Adole in Vera Cruz.

Bidens purpurea DC. and its var. *glabriuscula* DC. were founded respectively upon *Berlandier 1007* and *Berlandier 1021 pro parte*. These numbers, also *Berlandier 985* and *1163*, are especially well represented in the valuable herbarium left by M. E. Moricand (Del.). Excluding one sheet of *No. 1021*, which is typical *Cosmos scabiosoides* HBK., the rest show various intergradations from small leaves 2–3 cm. long, pinnatisect as described by DeCandolle, to larger leaves 6–8.5 cm. long, definitely bipinnate and matching those of the Pringle and the Adole plants. Thus *C. Uhdeanus* Kunth & Bouché, typified as it appears to be by *Pringle 8238* and by the Adole plant, is found synonymous with and referable to *C. purpureus* (DC.) B. & H.[2]

22. **Cosmos Nelsonii** Robins. & Fern. Proc. Amer. Acad. 44: 622. 1909.

Herba perennis, e radicibus tuberosis erecta, 6–8 dm. alta; caule parce subtetragono, subsimplici, glabro, sulcato, sicco stramineo vel purpurascenti. Folia petiolata petiolis alatis 0.5–2 cm. longis, petiolo adjecto 5–8 cm. longa et 4–9 cm. lata, circumambitu deltoidea, bi- vel tripinnatifida, principalium foliolis 2 vel 3 jugis, membranacea, segmentis lanceolatis, apice subacutis sed saepius non

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[1] It is quite probable, however, that the Hortus Berolinensis specimen just cited had been gathered from the same materials or their direct descendants. It was formerly in Schultz Bipontinus' private herbarium and its determination "*Cosmos atropurpureus* Kunth" is doubtless significant.

[2] *Bidens purpurea* var. *glabriuscula* DC. was merely a subglabrous variant as was pointed out by me in a former paper (Bot. Gaz. 80: 382. 1925), and does not appear to merit segregation, even as a forma.

calloso-mucronatis, plerisque 1–2 cm. longis et 3–8 mm. latis, integris vel 2–3-lobatis, supra olivaceis et vix puberulis, subtus paulo pallidioribus et saepe rubescentibus ac minutissime glanduloso-rugosis, margine scabriusculo-ciliatis, basi cuneato-decurrentibus, rhachi glabro gracili vix alato. Capitula circ. 3 vel 4, tenuiter pedunculata pedunculis usque ad circ. 12 cm. longis, pansa ad anthesin 4–5 cm. lata et circ. 1.1–1.4 cm. alta. Involucri campanulati bracteae exteriores circ. 8, lineari-oblongae, glabrae, acutatae, perspicue 5–7-atronervatae, plerumque 7–9 mm. longae et 1.4–1.8 mm. latae; interiores anguste ovato-oblongae, crebre striatae margine tenues, quam exteriores saepius paulo longiores. Flores ligulati 8–10, ligula elliptici vel oblongi, apice integri vel subdenticulati, rosacei vel pallide purpurei, 2–2.5 cm. longi et circ. 1 cm. lati; tubulosi flavi; antheris linearibus brunneo-violaceis. Achaenia submatura graciliter fusiformia, glabra, brunnea, rotundo-tetragona, unaquaque facierum profunde 1-sulcata, corpore circ. 11 mm. longa et circ. 1.8 mm. lata, erostrata, aristis saepissime 4, stramineis, tenuibus, retrorsum barbatis, quarum duae circ. 5 mm. longae aliae multo breviores.

Type specimen: Collected by E. W. Nelson, *No. 1176 pro parte*, at altitude of 2,900–3,300 meters, in vicinity of Cerro San Felipe, State of Oaxaca, Mexico, September 1, 1894 (Gray).

Distribution: Known only from the State of Oaxaca, Mexico.

Specimens examined: *E. W. Nelson 1176 pro parte* (type, Gray); *idem 1363*, alt. 7,000–9,500 feet, 18 miles southwest of City of Oaxaca, September 10–20, 1894 (Field; U. S.); *idem 1363a*, eodem loco et tempore (Gray; U. S.); *idem 1449*, alt. 5,550–7,500 feet, valley of Oaxaca, September 20, 1894 (Gray; U. S.).

23. **Cosmos peucedanifolius** Wedd. Chlor. And. 1: 70. 1855; *Bidens peucedanifolia* O. Ktze. and vars. *bipinnatisecta* O. Ktze. and *soratensis* O. Ktze. Rev. Gen. 3²: 137. 1898.

Folia saepius bipinnatisecta.

Foliorum segmenta (saepe anguste) linearia vel lineari-spathulata.....*C. peucedanifolius* sensu stricto.

Foliorum segmenta plerumque lanceolata vel ovata.

var. *tiraquensis*.

Folia integra vel parce pinnata.....var. *cochabambensis*.

Herba perennis, e radicibus tuberiformibus, erecta vel adscendens, simplex vel ramosa 1.5–5 dm. alta, caule ramisque sulcatis et teretibus vel interdum parce angulatis, glabris vel pilis sparsissimis instructis. Folia tenuiter petiolata petiolis planis vix marginatis 1.5–5 cm. longis, petiolo adjecto 5–14 cm. longa, saepius bipinnatisecta, segmentis primariis 2–3-jugis oppositis, ultimis (saepe anguste) linearibus vel lineari-spathulatis, membranaceis, glabris pubescentibusve, integris, subrevolutis, apice acutis, plerumque 2–5 mm. latis, terminali longiore. Capitula solitaria, pedunculata pedunculis tenuibus glaberri-

mis 1–3 dm. longis, pansa ad anthesin 4.5–7.5 cm. lata et 1.2–2 cm. alta. Involucri campanulati bracteae exteriores plerumque 7 vel 8, lanceolatae vel obovato-oblongae, glabrae, circ. 8–14-atro-striatae, supra acuminatae acumine angusto obtusiusculo, 8–15 mm. longae; interiores ovatae vel ovato-lanceolatae, quam exteriores nunc paulo breviores nunc paulo longiores. Flores ligulati plerumque 8, intense rosacei vel purpurascentes, ligula anguste vel sublate obovati, apice obtuso subdentati, 2–3.8 cm. longi et 1–1.9 cm. lati; tubulosi flavidi, antheris nigris, polline sulphureo- (non aurantiaco-) flavo; paleis interdum nematoideis. Achaenia anguste fusiformia, rotundo-tetragona, unaquaque facierum 1-sulcata, brunnea vel brunneo-atra, glabrata, superne rostrata, corpore circ. 1.5–2 cm. longa et circ. 1 mm. crassa, apice 2–3-aristata aristis retrorsum hamosis 0.5–1.5 mm. longis.

Type specimen: Collected by H. A. Weddell, *No. 3737*, in high, grassy places of Mt. Curi, Province of Tomina, Department of Chuquisaca, Bolivia, December, 1845–January, 1846 (Par.).

Distribution: In the Andes from southern Bolivia northwestward into Peru.

Specimens examined: *M. Bang 1302*, vicinity of Sorata, Bolivia, May, 1892 (Gray; Mo.; N. Y.; Phila.; U. S.; U. V.; type collection of *Bidens peucedanifolia* var. *soratensis* O. Ktze.); *O. Buchtien 611*, alt. 3,200 meters, mountain slopes, Unduavi, northern Yungas, Bolivia, February, 1915 (Field; U. S.); *Cárdenas 7* special, Cochabamba, Bolivia, 1922 (U. S.); *K. Fiebrig 2966*, alt. 3,300 meters, Patanca, southern Bolivia, February 1, 1904 (Gray); *O. Kuntze*, alt. 3,000 meters, Río Juntas, Bolivia, April, 1892 (N. Y.; cited by Kuntze for his *Bidens peucedanifolia* var. *bipinnatisecta*); *idem*, alt. 3,400 meters, Tunari, Bolivia, May 4, 1892 (Mo.; N. Y.; Kuntze's first cited specimen of his var. *bipinnatisecta*); *H. H. Rusby 1682 pro parte*, alt. 10,000 feet, Sorata, Bolivia, February, 1886 (Mo.; N. Y.); *C. H. T. Townsend 1507*, Pachicayo, Peru, March 27, 1913 (U. S.); *H. A. Weddell 3737* (type, Par.).

In the past, several students of South American Compositae have regarded *Cosmos diversifolius* Otto, a species originally described from material which clearly was Mexican, as extending from Mexico into Peru and Bolivia. A comparative examination of many specimens from northwestern South America and from Mexico shows, however, that the former, while differing among themselves considerably, are fairly well marked and can usually be distinguished from *C. diversifolius* without much difficulty.

Weddell (loc. cit.) was the first to segregate the South American material. He described three species, *C. integrifolius*, *C. peucedanifolius*, and *C. subpubescens*. The first and last of these are treated in the immediately following pages (pp. 441 and 442). His *C. peucedanifolius*, from Bolivia, may best be recognized by the narrowly

linear leaf segments: "foliis profunde pinnatisectis, lobis utrinque 2 anguste linearibus elongatis integris, terminali caeteris fere duplo longiore. . . ." (Wedd. loc. cit.). Otto Kuntze's vars. *bipinnatisectus* and *soratensis* are represented by good specimens still extant (Berl.; N. Y., etc.) and are seen to belong here, differing only in the here unimportant matter of the degree of leaf dissection.

Cosmos peucedanifolius var. **cochabambensis** (O. Ktze.) Sherff, Bot. Gaz. 88: 307. 1929; *Bidens peucedanifolia* var. *cochabambensis* O. Ktze. Rev. Gen. 3²: 137. 1898; *Cosmos integrifolius* Wedd. Chlor. And. 1: 70. 1855.

A specie foliis integris vel parce pinnatis, laminis segmentisve lineari-lanceolatis vel saepe anguste oblanceolatis differt.

Type specimen: Collected by Miguel Bang, *No. 1021*, vicinity of Cochabamba, Bolivia, 1891 (N. Y.).

Distribution: Andes region, Bolivia.

Specimens examined: *M. Bang 1021* (type, N. Y.; cotypes, Gray; Mo.; Phila.; U. S.); *H. A. Weddell 3663*, Province of Acero, Department of Chuquisaca, Bolivia, November and December, 1845 (Par., type of *Cosmos integrifolius* Wedd.).

C. integrifolius apparently was segregated from *C. peucedanifolius* mainly because of the leaf characters: "foliis lineari-lanceolatis, decimetralibus, integerrimis rariusve lobo lineari ad unum alterumve latus vel utrinque instructis. . . ." (Wedd. loc. cit.). The type collection of Kuntze's var. *cochabambensis* (*Bang 1021*) shows a slight tendency toward greater division of the leaves than described by Weddell (but not as found on his type specimens) yet otherwise agrees with his description of *C. integrifolius*. Kuntze's interpretation of this form, as representing a variety, is apparently nearer the truth than was Weddell's.[1]

Cosmos peucedanifolius var. **tiraquensis** (O. Ktze.) Sherff, Bot. Gaz. 88: 307. 1929; *C. subpubescens* Wedd. Chlor. And. 1: 70. 1855; *C. pulcherrimus* Schz. Bip. Bull. Soc. Bot. Fr. 12: 79. 1865 (nomen subnudum); *Bidens pulcherrima* Schz. Bip. Linnaea 36: 528. 1865–66 (nomen subnudum); *Cosmos marginatus* Klatt, Abhandl.

[1] Weddell's type sheet of *C. integrifolius* has two specimens, one about 5 dm. and the other about 8 dm. Both are simple below and only slightly branched above. The larger plant's longest peduncle is about 4 dm. long, with a small, oblong-lanceolate leaf (bract) 2 cm. long and 5.5 mm. wide, attached 4 cm. below the head. Both plants have most of the leaves elongate-linear or very narrowly lanceolate, 10–15 cm. long, the blades gradually narrowed below into a winged petiole. Several blades, however, are irregularly 2–3-furcate or incised with 1–3 elongate teeth or lobes, these reaching even 5 cm. in length and decurrent below into a widely alate petiole.

Naturf. Ges. Halle 15: 328. 1882; *Bidens peucedanifolia* var. *tiraquensis* O. Ktze. Rev. Gen. 3^2: 137. 1898.

A specie foliorum segmentis principalibus plerumque lanceolatis vel ovatis differt.

Type specimen: Collected by Otto Kuntze, at altitude of 4,000 meters, Tiraqui, Bolivia, April 1–4, 1892 (N. Y.).

Distribution: Southern Bolivia northwestward to central Peru.

Specimens examined: *Mrs. A. F. Bandelier 18*, alt. 12,500 feet, Is. Titicaca, Lake Titicaca, Bolivia, 1905 (N. Y.; nomen incolarum aymaranarum, Panti-Panti); *O. Buchtien 3074*, alt. 3,840 meters, Isla del Sol, Lake Titicaca, Bolivia, March, 1910 (Field; N. Y.; U. S.); *K. Fiebrig 2822*, alt. 3,000 meters, Pinos near Tarija, southern Bolivia, January 22, 1904 (Del.; Field; Mo.); *Cl. Gay*, Department of Cuzco, Peru, October, 1839–February, 1840 (Par.; type of *Cosmos subpubescens* Wedd.); *F. L. Herrera*, alt. 3,000–3,600 meters, Cuzco, Peru, July, 1923 (U. S.); *idem 1025*, alt. 3,700 meters, Hacienda Churu, Province of Paucartambo, Department of Cuzco, Peru, January (e pittacio lectoris ipsius), 1926 (Field; Gray, 2 sheets; Mo.; N. Y.; U. S.; nom. vulgare, Panti); *O. Kuntze*, alt. 4,000 meters, Tiraqui, Bolivia, April 1–4, 1892 (type, N. Y.); *G. Mandon 54*, alt. 2,650–3,000 meters, in uncultivated places, thickets, etc., vicinity of Sorata, along road to Lucatia, Bolivia, February–March, 1858 (Del., 3 sheets; N. Y.); *idem* (similiter) *54*, alt. 2,800–3,000 meters, in thickets everywhere, vicinity of Sorata, January–March, 1859 (Del.; Gray; N. Y.); *A. Mathews*, Province of Chachapoyas, northern Peru (Gray, 2 sheets; type material of *C. marginatus* Klatt); *H. H. Rusby 1682 pro parte*, alt. 10,000 feet, Sorata, Bolivia, February, 1886 (Gray; N. Y., cum specie ipsa; Phila.; U. S.); *A. Weberbauer 6381*, Peru, 1909–1914 (Field); *idem 7597*, alt. 3,600 meters, on grass steppe with scattering shrubs, Yanahuajra Valley, Province of Huanta, Department of Ayacucho, Peru, March 18, 1926 (Field).

Weddell's *C. subpubescens* was based on a plant by Gay from the Province of Cuzco, Peru. A careful reading of his description shows that here again the leaves were the chief basis of distinction: "foliis pinnatisectis, lobis utrinque 2–3 lanceolatis integris vel pauci-dentatis mucronatis. . . ." There have come from Cuzco and the adjacent region many specimens which match Weddell's description fairly well, also his type at Paris. One collection was that by A. Mathews from the Province of Chachapoyas, Peru. This was the basis of *Cosmos marginatus* Klatt. Two others, by G. Mandon and both under his *No. 54*, were from the vicinity of Sorata, Bolivia, and were the basis of the names (sine descript.) *Cosmos pulcherrimus* Schz. Bip. and *Bidens pulcherrima* Schz. Bip. Another was by Otto Kuntze from Tiraqui, Bolivia. This was the basis of *Bidens peucedanifolia* var. *tiraquensis*. It is through this form, which can not be regarded as of higher than varietal rank, that *C. peucedanifolius*

makes its nearest approach to low and rather dwarf forms of *C. diversifolius* Otto.

24. **Cosmos diversifolius** Otto in Knowles & Westcott, Flor. Cab. 2: 3. *pl. 47.* 1838; *C. reptans* Benth. Pl. Hartweg. 40. 1839; *Dahlia repens* Hartweg ex Benth. loc. cit.; *Cosmea diversifolia* Hort. ex Heynhold, Nomencl. 222. 1840; *Bidens diversifolia* Schz. Bip. in Seem. Bot. Voy. Herald 308. 1852–57 (cf. Ortgies in Regel, Gartenfl. 408. 1861); *B. reptans* Schz. Bip. loc. cit.; *B. dahlioides* Wats. Proc. Amer. Acad. 26: 142. 1891 (cf. Sherff, Bot. Gaz. 56: 494. 1913).

Caules inferne foliolati; capitulis ad anthesin 4–7 cm. latis; radiis vel rosaceis vel violaceis vel lilacinis; achaeniorum corpore plerumque 1–2 cm. longo.....*C. diversifolius* sensu stricto.

Caules scaposi; capitulis ad anthesin circ. 4 cm. latis; radiis subalbidis et parce violaceis; achaeniorum corpore 6–10 mm. longo. var. *pumilus.*

Herba erecta vel adscendens, e radicibus fasciculatis tuberosisque, 3–9 dm. alta, caule simplici vel ramoso, subtereti, saepius glabro rarius piloso. Folia alato-petiolata petiolis 2–9 cm. longis, petiolo adjecto 4–15 cm. longa, membranacea vel raro crassiuscula; nunc simplicia spathulataque, lamina 1.5–2 (–3.5) cm. lata, inferne in petiolum sensim angustata; nunc pinnatisecta segmentis cuneato-lanceolatis vel plus minusve ovatis, faciebus glabratis, margine ciliatis, apice acuto vel obtuso saepe mucronatis, 0.5–1.5 (–2.5) cm. latis. Capitula solitaria, longe perspicueque pedunculata pedunculis 2–3 vel etiam –4 dm. longis, pansa ad anthesin 4–7 cm. lata et circ. 1–1.6 cm. alta. Involucri glabri bracteae exteriores circ. 8, late oblongo-lanceolatae vel oblanceolatae, perspicue atro-striatae, apice saepe nitidae et induratae, 8–12 mm. longae; interiores latiores, parce longiores. Flores ligulati 8 (–10) vel rosacei vel violacei vel lilacini, ligula oblanceolati vel etiam obovati, apice integerrimi vel obscure denticulati, 2–3.5 cm. longi et 0.9–1.6 cm. lati; tubulosi lutei. Achaenia fusiformia, obcompresso-tetragona, plus minusve sulcata, atrobrunnea vel badia, glabra vel tuberculato-scabrida, superne sensim angustata vel etiam rostrata, corpore (0.7–) 1–2 cm. longa et circ. 1.1–1.9 mm. crassa, irregulariter 2–4 (–6) -aristata aristis tenuibus, retrorsum hamosis, usque ad 3.5 mm. longis.

Type specimen: Cultivated in the Berlin Botanical Garden in 1835, doubtless from Mexican material, and sent by Friedrich Otto to the Birmingham Botanical Garden, Birmingham, England. Represented by the type plate (Knowles and Westcott, loc. cit.).

Distribution: In southern Mexico from the states of San Luis Potosí and Michoacán southeastward through the states of Oaxaca and Chiapas.

Specimens examined: *Arsène,* ditches, Morelia, State of Michoacán, May, 1909 (Del.); *C. Conzatti & V. González 393,* alt. 2,640

meters, summit of Cerro La Carbonera, State of Oaxaca, August, 1897 (Gray); *T. Coulter 386*, Mexico (Gray); *A. Ghiesbreght 532*, flowering from July to end of October, State of Chiapas, 1864–70 (Field; Gray, 3 sheets; Mo.); *T. Hartweg 310*, in pine forests, Angangueo, State of Michoacán, 1837 (Del.; type collection of *Cosmos reptans* Benth.); *ex Hort. Berol.*, 1833 (Mo.) and 1839 (Gray); *E. W. Nelson 745*, alt. 5,500–7,000 feet, vicinity of Totontepec, State of Oaxaca, July 15–20, 1894 (U. S.); *idem 771*, eodem loco et tempore (U. S.); *E. Palmer 105*, Alvarez, State of San Luis Potosí, September 5–10, 1902 (Gray; Mo.; N. Y.; U. S.); *idem 210 pro parte*, eodem loco, September 28–October 3, 1902 (Mo., etc.); *idem 212*, eodem loco et tempore (Field; Gray; N. Y.; U. S.); *idem 213*, eodem loco et tempore (Field; Gray; Mo.; N. Y.; U. S.); *idem et C. C. Parry 481*, central Mexico, 1878 (Field; Gray; Mo.; Phila.; U. S.); *iidem 481½ pro parte*, eodem loco et tempore (Mo., etc.); *C. G. Pringle 3168*, hills, Flor de María, State of Mexico, September 3, 1890 (Field; Gray; type collection of *Bidens dahlioides* Wats.); *idem 3168a*, alt. 8,300 feet, grassy slopes, Flor de María, State of Mexico, September 2, 1892 (Field; Mo.; N. Y.); *idem 4777*, alt. 7,500 feet, Cuesta de San Juan del Estado, State of Oaxaca, August 2, 1894 (Carn.; Del., 2 sheets; Gray; Mo.; Phila.; U. S.; U. V.); *H. E. Seaton 356*, alt. 8,000 feet, Esperanza, Mt. Orizaba, August 15, 1891 (Chi.; Gray; U. S.); *E. & C. Seler 814*, Cerro de Buena Vista, June, 1888 (N. Y.); *L. C. Smith 539*, alt. 7,500 feet, Mt. Telixtlahuaca, State of Oaxaca, July 27, 1895 (Gray).

A species with great diversity of foliage and growth habit. A tendency toward chiefly basal foliage is noticeable but the variation toward chiefly cauline leaves is too frequent to permit of using this character in diagnosis. Herbarium specimens usually show the rays a faded-rose or lilac color; sometimes they are a rather intense purplish-red, but never a black-purple or atrosanguineous color as in the smaller-headed *C. atrosanguineus*. Usually the achenes are 2-aristate, much less often 3-aristate, and very rarely (*Pringle 4777*) even 4–6-aristate.

The garden var. *superbus* (Hort. ex Mill. in Bailey, Stand. Cyclop. Hortic. edit. 2. 2: 862. 1914) is unknown to me.

Cosmos diversifolius var. **pumilus** Sherff, Bot. Gaz. 88: 305. 1929.—Herba pumila, 3–4 dm. alta, foliis basalibus, pedunculis scaposis, capitulis ad anthesin tantum circ. 4 cm. latis, radiis subalbidis et parce violaceis, achaeniis atris erostratis corpore tantum 6–10 mm. longis et 0.7–1 mm. crassis, apice plerumque 2- (raro usque ad 4-) aristatis aristis tantum circ. 1–1.5 mm. longis.

Type specimen: Collected by C. A. Purpus, *No. 3029*, in meadows, Boca del Monte, State of Puebla, Mexico, September, 1908 (Field).

Distribution: Known only from the type locality in the State of Puebla, Mexico.

Specimens examined: *C. A. Purpus 3029* (type, Field; cotypes, Mo.; N. Y.; U. S.).

25. **Cosmos Schaffneri**, sp. nov.

Herba perennis, gracilis, e radicibus tuberosis fasciculatisque erecta, infra foliosa supra subnuda, caule vix ramoso inferne pubescenti superne subglabrato, circ. 4–6 dm. alto. Folia petiolata petiolis tenuibus rariter subalatis 3–6 cm. longis et maximam partem tantum 0.7–1 mm. latis, petiolo adjecto usque ad 12 cm. longa, bipinnatisecta, rubro-brunnea, foliolis membranaceis, subrevolutis, obsoletissime spinuloso-ciliatis, alibi glabris, eorum lobo terminali vel segmento principali nunc rhomboideo-lanceolato nunc deltoideo-ovato nunc rhomboideo-lanceolato omnino saepius 4–7-dentato dentibus subito sed non perspicue indurato-apiculatis; lateralibus 2 jugis saepe petiolulatis petiolulis tenuibus usque ad 6 mm. longis, inferne 1–2-lobatis lobo lanceolato vel ovato, 2–3 cm. longis, foliolo terminali paulo majore. Capitula tenuissime pedunculata pedunculis usque ad 3 dm. longis, solitaria vel pauca, pansa ad anthesin circ. 3 cm. lata et circ. 1 cm. alta (unicum florescens capitulum visum). Involucri glabri bracteae exteriores 7–9, adpressae, lineares, 5–7-nigro-nervatae, apice subacutae, ± 5 mm. longae, interiores lanceolatae ± 7 mm. longae. Flores ligulati (verisimiliter circ. 8) roseo-purpurei, ligula oblanceolati (tantum 4 visi), apice acriter circ. 3-denticulati, 1.2–1.6 cm. longi; tubulosi omnino purpurei. Achaenia non visa.

Type specimen: Collected by J. G. Schaffner, *No. 229*, in the valley of Mexico, southern Mexico (Gray).

Distribution: Known only from type locality in valley of Mexico, southern Mexico.

Specimens examined: *J. G. Schaffner 229* (type, Gray; cotype, Kew, cui commun. Julio, 1878).

Nearest to *C. diversifolius* Otto, from which it differs in its more delicate habit, the differently shaped leaves, the smaller flowering heads with their linear (not lanceolate) exterior involucral bracts, etc.

26. **Cosmos atrosanguineus** (Hook.) Ortg. in Hemsl., Biol. Centr. Amer. Bot. 2: 199. 1881; *C. diversifolius* var. *atrosanguineus* Hook. in Curtis's Bot. Mag. 87: *pl. 5227*. 1861; *Bidens atrosanguinea* Ortg. in Regel's Gartenflora 10: 406. *pl. 347*. 1861; *Dahlia zimapani* Roezl ex Ortg. loc. cit.; cf. Vilmorin, Fl. Pl. Terre edit. 2: 269. 1866.

Herba perennis, e radicibus tuberosis fasciculatisque adscendens vel erecta, plerumque tantum ad basim ramosa, 4–6 dm. alta, caule sulcato et saepe hinc inde puberulo. Folia longe petiolata petiolis alato-marginatis plerumque glabratis 3–8 dm. longis, petiolo adjecto 7–15 cm. longa, saepe pauca integra ac spathulata vel 1 vel 2 lobis lateralibus instructa, principalia pinnata foliolis rhomboideo-ovatis et basi cuneato-decurrentibus, integerrimis vel remote serratis, membranaceis, supra viridibus subtus pallidioribus, pilis adpressis et non numerosis inconspicue hispidis, margine levibus vel vix spinuloso-

ciliatis, lateralibus 1–3 jugis 2–5 cm. longis, terminali basi saepe irregulariter 1 vel 2 lobis lateraliter instructo. Capitula solitaria longissime pedunculata pedunculis tenuibus usque ad 3.5 dm. longis, pansa ad anthesin circ. 3.7–4.2 cm. lata et circ. 1.4–1.6 cm. alta. Involucri campanulati bracteae exteriores circ. 8, adpressae vel demum subreflexae, lanceolatae vel ovato-lanceolatae, apice subacuto parce induratae, tergo marginibusque glabrae, 7–15-nerviae, 8–10 mm. longae; interiores lanceolato-ovatae vel (saepe late) ovatae, apice saepius coloratae, 10–13 mm. longae. Flores ligulati circ. 8, ligula anguste obovati, profunde perspicueque atrosanguinei, apice subtruncato plus minusve denticulati, 1.5–1.9 cm. longi; tubulosi supra atrosanguinei, antheris brunneis, polline perspicue aurantiaco; paleis linearibus, apice acutis atrosanguineisque. Achaenia tenuiter fusiformia, infra medium latissima, supra sensim elongato-rostrata, rotundo-tetragona, unaquaque facierum 1- (raro 2-) sulcata, glabra, brunneo-grisea vel nigrescentia, corpore 1.3–2 cm. longa, 1–1.5 mm. crassa, apice 2–3- (fide Ortgiesii etiam 4-) aristata, aristis tenuibus, retrorsum hamosis, saepe rubescentibus, duabus principalibus circ. 4–4.5 mm. longis, aliis multo brevioribus.

Type specimen: Hooker's material was raised from seeds sent a "Mr. Thompson, of Ipswich, from Mexico." Specimens should be at Kew. There is little doubt, however, that Mr. Thompson had received his seeds from the same source as had Ortgies. The latter was head gardener at the Botanical Garden of Zurich and cultivated this same rare (and up to that time unknown) form in Zurich contemporaneously with Hooker's cultures. Ortgies stated that his seed had been collected by Roezl near Zimapán, State of Hidalgo, Mexico.

Distribution: In east-central Mexico from the State of San Luis Potosí southeastward to the State of Hidalgo.

Specimens examined: *Cult. e sem. mexicanis a Thompsonio missis* (Kew); *Hortus Berolinensis*, July 15, 1863 (Par.); *Hortus Cantabrigensis*, cult. anno 1871 (Gray; N. Y.); *Hort. Vindobonensis*, cult. (e sem. Hort. Turic. anno 1867), August, 1868 (Mus. V.; U. V.); *E. Palmer 210 pro parte*, Alvarez, State of San Luis Potosí, September 28–October 3, 1902 (U. S.); *idem et C. C. Parry 481½ pro parte*, central Mexico, 1878 (Mo.); *E. E. Sherff 5010*, cult. in Hort. Cantabrig., August 12, 1929 (Berl.; Field; Kew).

At Harvard University Botanical Garden (Hort. Cantabrig.) this somewhat bizarre-looking species has been cultivated for more than half a century. The plants there show no tendency to approach in floral or achenial characters *Cosmos diversifolius* Otto, as a variety of which Hooker treated this species. Asa Gray had labeled the original sheet of the Harvard material (Gray) *"C. diversifolius."*[1] Neither Hooker nor Gray seems to have appreciated the diagnostic importance of smaller flowering heads with dark purple or atrosan-

[1] Formerly I followed Gray's treatment and hence, in several European herbaria, unfortunately reduced specimens of *C. atrosanguineus* to *C. diversifolius*.

guineous florets. This diagnostic importance was recognized by Robinson and Fernald, however, when, in 1909, they distinguished (Proc. Amer. Acad. 44: 624) their new *Cosmos Pringlei* "by its larger and much paler rays, yellow disk-flowers . . ." from *C. scabiosoides* HBK.[1]

SPECIES EXCLUSAE

Cosmos chrysanthemifolius HBK. Nov. Gen. et Sp. 4: 188 (239). *pl. 382.* 1820. =*Bidens chrysanthemifolia* (HBK.) Sherff, Bot. Gaz. 61: 501. 1916.

Cosmos chrysanthemoides HBK. ex Schz. Bip. in Seem. Bot. Voy. Herald 308. 1852–57. =*Bidens chrysanthemifolia* (HBK.) Sherff, loc. cit.

Cosmos luteus Curt. Bot. Mag. 41: *pl. 1689.* 1815. =*Bidens serrulata* (Poir.) Desf. Cat. Hort. Par. edit. 3. 186. 1829.

Cosmos multicaulis D. Don ex Seem. Fl. Vit. 144. 1865–73. =*Glossogyne tenuifolia* (La Bill.) Cass. Dict. Nat. Sc. 51: 475. 1827.

Cosmos pilosus HBK. Nov. Gen. et Sp. 4: 189 (241). 1820. =*Bidens pilosa* var. *calcicola* (Greenm.) Sherff, Bot. Gaz. 80: 377. 1925.

Cosmos pinnatus Jacq. ex Steud. Nom. edit. 2. 1: 426. 1840. =*Coreopsis coronata* fide Steud. loc. cit.[2]

Cosmos roseus Mart. ex Steud. loc. cit. (nomen nudum).

Cosmos tenellus HBK. Nov. Gen. et Sp. 4: 188 (240). 1820. =*Bidens pilosa* var. *bimucronata* f. *odorata* (Cav.) Sherff, Bot. Gaz 81: 41. 1926.

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[1] The fact that *Palmer 210* and *Parry & Palmer 481½* each include both *C. atrosanguineus* and *C. diversifolius* must be explained as a case of intermixed rather than of intergrading specimens.

[2] From Steudel's omission of the authorship of *Coreopsis coronata*, it must be understood that he had in mind the *C. coronata* Hook. (nec Linn., Bert., Walt., etc.), which alone he retained as valid under *Coreopsis* (loc. cit. 420).

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